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[Special Correspondence by Telegraph.]

TENTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

SAN FRANCISCO, CAL., July 17, 1902.

Dear JOURNAL: The Tenth Annual Meeting of the Pacific Coast Gas Association was brought off, as per programme, on the appointed days, in the handsome lecture hall of the Pacific Gas Improvement Company, one of the features of the Company's well arranged new office building on Sutter street. The undaunted "man from Walla Walla," Mr. C. E. Burrows, directed the proceedings from the presidential chair, and he was ably assisted by Secretary Grimwood, whose alertness shows no shrinking. The weather during both days was of the California sort. The attendance was excellent, no less than 66 delegates reporting at roll call, and a feature of the sessions was the strict attention paid to business. The first session was called to order at 10:30 A.M. of the 16th, and little time was wasted in getting down to work. The address of President Burrows was like the man—right to the point. He reviewed at some length the growth and progress of the gas business on the Coast during the past year, and reported, from replies received to inquiries sent out by him, that the gain in output on illuminating account averaged 24 per cent., while the increase on cooking, heating and power account averaged 37 per cent. He indorsed and advocated the proposition to establish the advisory committee suggested by Mr. Britton last year, and also hoped that action would be taken speedily in respect of permanent quarters for the library, the outlook for the good growth of which was excellent. He also expressed the belief that the best method of fostering the interests of the gas and electric companies of California would be through the establishment of a State commission. The address was well received, as it should have been. Secretary and Treasurer Grimwood's reports showed that the Association was in excellent financial condition, and after their reading the election of new members was completed, the result being an addition of 20 names to the roll; pretty good evidence that the Association is to go on to wider fields of usefulness. The papers read the first day were those by Mr. Jno. L. Howard, on "Fuel Conditions in California;" "Municipal Ownership," by Mr. F. J. Symmes; "An Experiment on the Principles of Purification," by Mr. E. C. Jones; and the "Wrinkle" and "Experience" departments, the matter for which was respectively prepared by Mr. George S. Colquhoun and Mr. R. P. Valentine. The latter budgets were especially interesting, as were the papers by Messrs. Howard and Jones.

The papers on the second day were: "Differential Gas Rates," by Mr. M. C. Osborn; "The Recognition of the Engineer, with Especial Reference to Gas Engineering," by Mr. L. P. Lowe; "Electrically Operated Appliances in Gas and Electric Light Works," by Mr. George C. Holberton; and an interesting dissertation on the "Methods of Determining Water and Sediment in Crude California Petroleum." I feel safe in saying that a more interesting series of papers has yet to be presented at the meeting of any other American Gas Association. The officers elected were:

President—M. C. Osborn, San Rafael, Cal.
Vice-President—W. A. Aldrich, Spokane, Wash.
Secy.-Treas.—J. B. Grimwood, San Francisco, Cal.
Directors—J. A. Britton, R. P. Valentine, C. O. G. Miller and G. H. Hollidge.

The President appointed Messrs. Britton, Jones and Martin on the Advisory Board, in line with the recommendation contained in the President's address; and a resolution amending the constitution and by-laws to the effect that corporations, etc., could become eligible to membership, was adopted. This act, however, does not carry with such membership the privilege of voting or of holding office. The Report of the Library Committee showed that many volumes had been acquired through gift or purchase, that ample funds were on hand, and that altogether there was every indication that the library scheme would be a pronounced success. A very noteworthy and loudly applauded act was the declination to accept the resignation of Mr. Wm. G Barrett, whose long and honorable connection with the gas lighting supply of San Francisco, through the old San Francisco Gas Company, made him a dear, familiar one to the entire Coast fraternity. In fact, instead of letting him go they elected him to honorary membership. The banquet was, of course, a success, 60 partaking of its material and mental pleasures. The outing was an enjoyable feature of the social side, the inspection of the Navy Yard proving all that it was predicted it would be. The morning weather on the Bay was all right, but the return was made in foggy atmosphere and rough sailing. The banquet was to be credited to Mr. John Martin, who did things up in his accustomed thorough style, and the substantial fare on the Bay voyage can be put down to our host, Mr. Lowe. This brief outline of the meeting I may finish thus: The weather was good, the attendance was excellent, the papers were practical and valuable, as ditto the discussions. The accommodations were perfect, the interest was sustained, the social features were unsurpassable. There you have it. I would indeed be neglectful, though, were I to fail to make hearty acknowledgment of the successful courtesies and attentions extended by the Pacific Gas Improvement Company.—B.

LIBRARY JUL 21 1902 SMITHSONIAN REPOSIT.

NOTES.—

MR. N. W. GIFFORD, Secretary of the New England Association of Gas Engineers, has resigned the superintendency of the New Bedford (Mass.) Gas and Edison Light Company, in order to assume the responsible position of General Manager to the East Boston Gas Company. We congratulate the East Boston Company over securing Mr. Gifford's services, and we congratulate Mr. Gifford on his promotion.

MR. C. H. PAYSON has been granted a franchise for the construction and operation of a gas works at Kirksville, Mo.

MR. A. D. CRESSLER, the clever President and General Manager of the Kerr Murray Manufacturing Company, of Fort Wayne, Ind., has just cause for pride respecting the studiousness of his boys, two of whom graduated from Yale University last June. Alfred M. graduated from the academic division, with the degree of B.A., and George H. graduated from the Sheffield Scientific School, with the degree of Ph.B. It is the intention of both young men to immediately take positions in the shops of the Company, there to become practical masters in the art of planning and constructing gas works apparatus. The best of good luck to them, and there is little doubt of their success.

SOME time ago we noted that Messrs. Graham, Morton & Co., Ltd., of Leeds, England, had entered into an arrangement whereby they were to be represented on this side by the Messrs. Adam Weber Sons, of this city. We also reported at the same time that the Leeds firm had recently secured a contract for the placing of an important installation of inclines on their plans for the Paris (France) works. Last week, in a letter from a correspondent in England, came to hand the following further mention of the Paris contract: "Messrs. Graham, Morton & Co. have received the contract for a complete installation of inclined retorts, including the foundations, retort house, roof, furnace work, iron work, conveying machinery, coke plant, etc.—in fact, all complete, in working order, and to be erected in Paris. This work will be built with all the latest improvements, and will be the first *large* installation erected in France."

THE Seventeenth Annual Outing of the employees of "The Jeffrey Manufacturing Company," of Columbus, O., which was held in Idlewild Park, Newark, O., Saturday, the 12th inst., was a most enjoyable affair. The programme was a well diversified one and included a game of baseball, 15 "mixed events," each of which carried a prize for the successful contestant, a theater party, dancing galore, and plenty to eat and drink.

THE Milwaukee (Wis.) Gas Light Company for the past 3 years has paid to its regular employees each 6 months a dividend of 6 per cent. upon the wages earned during the prior 6 months. This year the dividend time for the first half came to pass on the 15th inst., on which date the men were agreeably surprised to find that the Company had increased the rate to 10 per cent. The aggregate sum thus distributed will amount to $8,000, and the per capita payments will average between $40 and $50.

THE able methods of Mr. John J. Cummins, Vice-President and Manager of the Syracuse (N. Y.) Lighting Company, are pretty well shown in the short statement that the Company, which was organized July 1, 1901, was the successor to a pretty well mixed up financial tangle. Since its formation, however, it has paid its bond interest of 5 per cent. on $2,000,000, a 5 per cent. dividend on its preferred stock of $1,000,000, and has accumulated a surplus besides. It took over the Syracuse Gas Company, July 1, 1902, by exchanging $1,975,000 of its common stock for the stock of the Syracuse Lighting Company. The latter concern was organized financially as follows: Bonds, 50-year, 5 per cent., gold bearing, $2,500,000; preferred stock, 5 per cent., non-accumulative, $1,000,000; common stock, $5,000,000. Of these classes the respective amounts issued are as follows: Bonds, $2,000,000; preferred, $1,000,000; common, $3,000,000. The Company controls the lighting of the city in so far as that is accomplished from central stations. Its business has been doubled in 2 years, and it is now increasing at the rate of 30 per cent. per annum.

THE properties of the Le Roy (N. Y.) Gas and Electric Company were sold at public auction, in pursuance of a court decree, at Batavia, the morning of the 11th inst. The purchaser was Mr. J. H. Ward, of Batavia, whose bid was $11,100. Mr. Ward acted for the bondholders, the indebtedness to whom on every account was $40,000.

THE franchise for the right to construct and operate a gas plant at Lead, So. Dak., has been awarded to the Dickinson-Ames Company.

AT the annual meeting of the Louisville (Ky.) Gas Company the following Directors were elected: H. V. Loving, John Stites, K. W. Smith, D. X. Murphy and Udolpho Snead. The Directors chosen to represent the city in the Board were: G. Gaulbert, W. J. Abram, W. H. Edinger and T. Hunt Stucky.

Address of the President (Mr. S. Westfall Durkin) of the Incorporated Gas Institute, on the Occasion of Its 39th Annual General Meeting, Southampton, England, June 10-12.

Gentlemen—It is usual for the President to thank the members, at their annual meeting, for the honor of placing him in that position. Why your choice fell upon me, it is difficult to say; for I am afraid, in looking back, that I have done little to deserve the honor, but nevertheless will ask you to accept my thanks and

"Be to his faults a little blind
And to his virtues very kind."

I am pleased to welcome you to my native town, with its beautiful surroundings, and trust you will enjoy your visit to the full.

It happens that I am serving my fiftieth year of service with the Gas Company here; so you will see I am bordering on the time known as the "sear and yellow leaf." When I started on my career as a pupil under my predecessor, the late James Sharp (whose memory I revere), gas engineering was not as it is to-day. It is true there was Thomas Greaves Barlow, Thomas Hawksley and Alexander Croll, former Presidents, and others who could be named; but young men had not the advantages in training for their work as in these later days. I recollect becoming a member of the School of Art in this town. The master put me on to freehand drawing. At last, I resented this, and said I wanted some knowledge of mechanical drawing, and was given a plan, a section and an elevation of a lead pencil to start with. However, later on I had the assistance of a friend who started a mechanical drawing class, and obtained some further knowledge, but had to train myself a good deal. But it was a case of "knowledge coming after." I have no doubt many others were in the same position as myself in those back days; but as the years have passed on, these things have been changed, and with a perfected knowledge of what is required, young men of to-day (if they do not give themselves up too much to sport and pleasure) can, and may be, better equipped for the duties devolving on a gas engineer, and this equipment becomes imperative in these days of competition with other means of artificial lighting.

It has been my pleasure for many years past to have received valued help and assistance from my esteemed friend John Birch Paddon, who became Consulting Engineer to my Company prior to Mr. Sharp's retirement (when I was young and inexperienced); and I take this opportunity of thanking him for what he has been to me all these years.

I must not weary you further with these personal matters. I would generalize a little so far as this town is concerned on our so called "decaying industry." The manufacture of gas in 1852 was 34 million cubic feet; in 1901, it was 547 million cubic feet; and it is still advancing. The town and suburbs are growing fast; and the works have to keep ahead of the increase. Already a set of new purifiers and a 2-million gasholder have been erected; and other plant must be shortly laid down to complete a third section of producing power. Difficulties of obtaining land have had to be met; and the executive of my Company have been successful in coping with the trouble. There is a great future before this Company, and we cannot sit with folded arms. The increasing responsibilities of gas managers in these days get heavier year by year; and it is no exception in my case.

It was in the early sixties that our carbonizing plant was transformed from iron to clay retorts, with the necessary equipment of exhausters. This was a step in advance, although direct firing and hand stoking are adhered to, and still hold a position in the works here. Owing to the prescribed area, our retort houses are short, and this would involve heavy expenditure in machinery, and to put in regenerator furnaces would mean going below the high water level of our river. But notwithstanding we may be thought behind the times, we have done fairly well, and, given a fair quality of coal, we average 10,927 cubic feet to the ton. I have been troubled with choked ascension, bridge and dip pipes, and thick tar in the hydraulics. The one follows the other; and this led my assistant to suggest an experiment. I now set out some advantages obtained by the use of 20-foot retorts divided in the center.

1. A considerable reduction in the number of stopped ascension, bridge and dip pipes, consequent on making the gas produced in each 10 feet of retort pass up the ascension pipe attached thereto.

2. If one end chokes (which is an infrequent occurrence), only half the retort is off work. With through retorts and an ascension pipe at each end, it is quite a common occurrence (although the dip pipes have been set for an equal seal) that the gas will pass up only one pipe at one time, and another time the other, and *vice versa*, with the result that one pipe, having all the work to do, quickly chokes, and then the other

follows. In this case the whole retort has to be out of action, with consequent loss of gas during the clearing of the pipes.

3. The tar in the hydraulics keeps very much thinner; and with Livesey and Tanner's overflows this is a great boon.

4. What choking does take place has been brought nearer to the retort—viz., at the entrance to the ascension pipe. But it is nothing like the trouble, and it is a more get-at able-place. A few strokes of the auger quickly clear it.

5. Another advantage is that, whichever gang is ready first starts charging, without waiting for the opposite side (as in through retorts), who are not so active or may have had a slight hindrance.

6. Another point which I think may safely be claimed, is less naphthaline produced—the gas not having traveled over so much heated surface as in a through retort, more especially if only one ascension pipe acts.

7. Scurfing only half a retort is required at a time. The carbon is, when sufficiently thick, cut away by the usual means, and comes away *en bloc.*

I have had a favorable opportunity of comparing the results obtained by the divided and the through retorts the two systems working alongside one another, with two benches to one hydraulic each side. In the case of the hydraulics connected with the two benches divided in the center, the tar gives no trouble; it keeps so fluid that one of the two cocks on each side is open only, whereas the others need constant attention to prevent choking with thick tar.

The following table will show, by comparison, the practical results of two months' working, Oct. 8 to Nov. 4, and Nov. 13 to Dec. 13, 1901:

	Through Retorts. Average.	Divid d Retorts
Ascension pipes and at mouthpiece.....	144	49
Bridge and dip pipes..	276	80

This shows a considerable reduction, and to the advantage of the divided retort; and further, the character of the tar in the bridge pipes is of a spongy character, with traces of ammoniacal liquor and no sooty matter or pitchy tar. I am gradually extending the system as benches are renewed.

Clay retorts, when introduced here, were blessings in disguise. Some years since more producing power was required, and a retort house, originally fixed up for iron retorts, was remodeled for clay retorts, and in the same area some 100 per cent. more gas was made. This leads me to think that, where land is scarce, there may be economy in the introduction of sloping retorts. You have to go up, it is true; but you gain in ground space, and this system, for the reasons stated, will possibly have to be considered here.

Carburetted Water Gas.—We have been running this system for about two years; and three sets of plant have been placed in part of a retort house, for 1,300,000 cubic feet per day, in a space formerly producing 320,000 cubic feet of coal gas—being an increase in producing power of nearly a million on the same area. The disused coal stores are arranged for the necessary boilers, engines, blowers and exhausters—making, so far, a very compact plant, which has worked satisfactorily. But let me say there are many details which you have to find out, and "when found make a note of" for future use. I am not in a position to give you any figures as to cost, owing to want of space for a separate station meter; but, for our purposes, we work on estimates. I find we use for generators and boilers 49 3 pounds of coke per 1,000 cubic feet of water gas made.

Purification.—At the works under my charge, the principal agent used is white chalk lime with oxide catch boxes. Since 1898 we have been working under the sulphur clauses; but for this we were quite prepared, having worked up for it for several years prior to that time. The areo-oxygen process, duly measured in, has proved very useful. The cost works out for coal and carburetted water gas at 0.82d per 1,000 cubic feet of gas sold. From some figures collated, the quantity of unslaked lime per ton of coal used, and per 1,000 cubic feet of carburetted water gas as estimated, stands as under. For the year 1901:

Per ton of coal carbonized.....25.36 pounds.
Per 1,000 cubic feet of carburetted water gas..... 7.09 "

The two gases are separately purified, and mixed at the inlet of the catch purifiers. In the catch purifiers when used for coal gas only, a considerable quantity of naphthaline was formed; but this no longer takes place with the mixed gases. I do not, however, find it cures the trouble in the distribution plant.

Distribution.—In an increasing district, this part of our work needs much consideration, to apportion the size of trunk mains, to feed the lateral mains, and to keep up a generous supply throughout the district. I find that in 1853, the areas of the outlet mains here were 161 square inches; in 1901, they were 1,288 square inches, for supplying the urban and suburban districts.

The rapidly extending system of prepayment installations renders it desirable, when opening up a new district, to provide larger mains than formerly. As an example, in the early part of 1899 my Directors determined to go in for this system; and in less than two years I laid in between 5,000 and 6,000 new services for these installations alone, and we have not yet finished, nor saturated the whole of our district. So I find that the days of 2-inch and 3-inch mains are numbered, and 4-inch is becoming my favorite minimum. The labor is about the same, and the extra cost of pipes will well pay.

In going out from the works into different parts of the district, we have to pass under railway level crossings and over iron bridges; and in the latter case the joints are made with rubber rings, and the spigot impinges on a plaited cane washer. We have experienced no trouble from the expansion and contraction of the structures.

Municipal enterprise gives trouble where electric light and tramway is supplied by them. We have had several narrow escapes from catastrophe; but up to the present time only two cases of electrolysis, and three or four short circuits. [The damaged pipes are here for your inspection.] But what the future will bring forth, I cannot say. The authorities seem to think "sufficient unto the day is the evil thereof." We may hear more of this from Mr. James Swinburne, M. Inst. C.E., in his lecture to us.

Under this head, it may be of interest to show, for five years ended in 1901, how the day load has increased, as against the night load:

		Cubic Feet.		Cubic Feet.
1897.	6 A. M. to 6 P. M.	..152,119,000	6 P. M. to 6 A. M.	..285,240,000
1898.	" "	..159,033,000	" "	..292,738,000
1899.	" "	..176,523,000	" "	..302,494,000
1900.	" "	..202,030,000	" "	..309,335,000
1901.	" "	..227,724,000	" "	..319,849,000

In these quantities is included the unaccounted-for gas, which may be taken at 5 per cent. The increased day load is accounted for by the use of 5,700 prepayment ranges, and 2,480 ordinary ranges on hire. The Sunday day consumption during warm weather is enormous.

Gas Engines.—This is an increasing quantity, although we have no local manufactures. The engines are used for various trade purposes, from chopping sausage meat up to printing the five local newspapers; the number in use being 142. The united horse power is 665, and ranges from ½ to 20-horse power.

Street lighting here, in the principal thoroughfares, is carried out by electric light from the corporation works, and for the time the gas lamps are ousted. In other parts of the town gas is still used; and the lighting authority have recently had the temerity to experiment with incandescent gas lighting.

It may be of interest to state that one of the Urban District Councils supplied by this Company adopted the incandescent system with ordinary lanterns, using the plain, inverted pear-shaped globe and the "C" bye-pass burner; and their surveyor informs me that four mantles were used per lamp for nine months. But in two lamps he had fixed up, six mantles in one and nine mantles in the other were used in twelve months. The mantles appear to vary in quality.

The electric light has been supplied at a loss; and my Company with other non-users, have had to pay their proportion of the cost in the rating. This, of course, adds to the price of gas at the meter, but no one seems to trouble about it.

The Welsbach system is in very general use; and now that mantles are cheaper (thanks to Mr. Livesey) it will no doubt increase even if the output decreases, and it will be the right thing to step in and look after these consumers.

When this Company went to Parliament in 1898, we had 1 candle added (that is, from 14 to 15 candles); but I very much doubt whether it is appreciated. The extra cost is not worth the candle.

I presume it would hardly be the correct thing not to say a word about the naphthaline trouble. It is still with us; and, notwithstanding the use of carburetted water gas, I do not find any diminution in stopped service pipes or mains. I am, however, assured that it will go; but perhaps an addition of 50 per cent. may be required to get over the difficulty.

There is one thing I do know—that, for some time past, on one of our districts, where we were troubled in certain places on the leading main as well as in service pipes, the Hastings carburation process has been working; and I am delighted to say that there is a complete immunity from complaints, and the plant laid down will cope with an increasing demand more readily than at present.

I must now draw these cursory remarks to a close. In doing so, I

would urge on young men to make use of every advantage at their disposal, to be fully equipped for the conflict before them, for "knowledge is power," and a good character is better than great riches. Our employers, be they company or corporation, as well as ourselves, are indebted to many outsiders for experience brought into practical use—such as Crossley Brother and Tangyes, and Mr. Dugald Clerk (whose paper we are expecting presently), and others, who have perfected the gas engine.

For developing the use of gas for cooking and technical purposes, much is due to Mr. Thomas Fletcher; and then, on matters chemical, it is always delightful to hear a Vivian Lewes. I must not forget the Technical Press, who keep us so well supplied with matter for study and reflection; but whether we have time to absorb all the matter, is another question.

I trust the amalgamation of the Institution and Institute will take place.

I have only to say that what I have put before you has been more managerial than engineering, and this under many difficulties; and, if the matter is not up to the mark, my intentions were good. I thank you for so patient a hearing.

Some History Relating to the Gas Supply of Milwaukee.

A recent issue of the Milwaukee (Wis.) *News* contained the following interesting historical matter respecting the gas supply of Wisconsin's handsomest city:

A straight half century of years, short only by four brief months, has passed to the rear and been safely tucked away in the endless winding sheets of Time since Milwaukee first tasted the luxury of a city lighted by gas.

What history has been made, what achievements accomplished, what growth in all that makes municipal greatness has been recorded; what wonders for Milwaukee have been wrought since that now far away night, November 23, 1852, when the then scarce 25,000 inhabitants of Milwaukee crowded into the scanty business center and stood with gaping mouth and starting eyes to witness the first illumination of the city by gas.

In the marvelous developments marked by that night's display the then active populace, few of whom remain to tell the story, dreamed of the passing of the pine torch, the tallow candle, the oil lamp and all other primitive devices for necessary illumination, and dwelt in ecstacies upon the unstinted luxury of gas light in home, in business mart and on the public highway. Yes, sir, the very streets of the then baby city lighted by gas. Marvelous! Wonderful almost beyond conception. No wonder the few remaining spared ones from the long ranks of the silent majority still recall that occasion as one of the really great events in the history of the present great city, now known throughout the civilized world as one of the greatest cities in many respects on this boundless ball of wax called a globe.

Since then—since the advent of gas in Milwaukee, a trifle less than 50 years, the scarcely 25,000 population has grown to over 300,000; the few productive industries, yielding barely $50,000 worth of products in a year, have grown and been multiplied to a producing capacity of over $200,000,000 worth of goods in 12 months, which find ready sale in all markets of the world; the employment of a few hundred persons in productive industries has increased to over 73,000 constantly employed in turning out an endless variety of products for disposal in the trading marts of all the world; the then less than 50 miles of railroad and a few diminutive water craft available for transportation purposes, have grown to over 16,000 miles of railroad directly tributary to Milwaukee, giving direct connection with all of the great railroad systems on the continent, and to an aggregation of steamer lines which, added to the railroads, gives the city a system of 36 distinct transportation lines to the markets of the country and the world at large.

These are a few of the features of Milwaukee which have experienced marvelous growth since the advent of gas light, 50 years ago. And the Milwaukee Gas Light Company, which furnished the lights for that event on the 23d night in November, 1852, has kept pace with the greatest of developments. Its remarkable progress has been marked, all the way, by generous, and sometimes by almost stupendous expenditures in its determination to supply this growing great city with all of the advantages, conveniences and even luxuries known to the world in the line of gas illuminating and heating. And none of the tribe of gas producing agencies the world over have outdone it in accomplishments in the interest of a progressive people, appreciative of advantages and benefits resulting from wisely directed consumption of gas for illuminating, heating and power producing purposes.

While the little, young city has been growing big and great, the Gas Company has not fallen behind it. As a matter of fact, the Gas Company has often taken the lead and set the pace for improvement and advancement. It has never waited for the necessities of the community to demonstrate the needs of increased gas facilities. It has been mindful of the coming requirements and through judicious foresight and unstinted expenditure has ever been ready to supply demands upon it when they came.

Ten years ago the Company foresaw approaching rapid growth of the city in population and industries, thus insuring increased requirements at its hands. It then had about 12,000 gas meters in use, measuring the gas consumed in the city. It did not wait for increased demand to force it to enlarge its gas producing capacity, but promptly enlarged its plant and met every requirement, until it now has nearly 60,000 meters in use, and every demand upon it is promptly supplied.

Nearly a score of years ago some persons thought electricity would soon cause a complete disuse of gas for illuminating purposes. But the Milwaukee Gas Light Company partook of none of that alarm. It proceeded to provide for a more extensive use of gas by providing facilities for better lights and better economy in its use. It has supplied its customers with every improvement the world's genius has produced for better light production, and always at a minimum of cost to the people for the improvements made, and has reaped good results in the increased demand for its product.

Years ago the Milwaukee Gas Light Company foresaw the practical certainty of great coal combinations, in the future, and the demand for exorbitant prices for coal. In order to be with the people when that emergency should come, it prepared to furnish gas for fuel and power purposes. As a result there are now nearly 25,000 homes in Milwaukee in which gas is used for fuel, with the best of satisfaction to all consumers, whose abundant or scanty cash, as the case may be, is not disturbed by coal combinations. As a further protection to the people the best gas stoves and ranges have been sought out by the Company and their use is recommended, connections with the mains, to permanent users, being made by the Company without cost to the consumer. Thus, with gas the cheapest and most convenient home fuel available, consumption of the product increases each year.

The use of gas engines in productive industries in Milwaukee is extensive and increasing each year. A few years to the rear a gas engine operating the machinery of a manufacturing plant was a rarity. Now there are scores of them and that peculiar and almost constant popping of the exhaust from the gas engines of such concerns is heard throughout the manufacturing districts of the city. But the Milwaukee Gas Light Company did not wait for those now extensively using gas for such purposes to find the real economy in it and then ask for the gas. It employed expert and scientific skill, regardless of cost, and developed the means of economy. This insured demand for the gas and gave the Company its reward.

Thus, while the patronage of the Milwaukee Gas Light Company has been fully quadrupled in the last 10 years, that result is not to be numbered as among the fruits of chance. It is a result wisely planned for and brought about by constant labor. The present magnitude of the Company is a result of systematic upbuilding, in perfect harmony with the growth of the city But the end of growth and improvement is not yet. While the present capacity is ample for all immediate demands, the same scale of foresight which has provided for the great increases in the use of gas during the last 10 years sees, in the near future, even greater fields of usefulness for this light, heat and power producing agency. It sees a reasonable certainty that the population of Milwaukee and its vast array of productive industries will be more than doubled during the next 20 years, and with that growth a corresponding increase in the use of gas. For this condition the Company is already making provision by building a new gas plant, the completion of which will require several years of time, as well as an enormous expenditure of money, and which will be ample in its gas producing capacity for the requirements for many years to come.

Thus, it is seen that while Milwaukee is the must rapidly growing city in the country, the Milwaukee Gas Light Company, whose interests run parallel with those of all other agencies interested in the city's development, is never laggard in the performance of its duties, and that whatever demands future city and industrial development may place upon it will be safely and successfully met, to the complete satisfaction of all interested. It is performing its full share in the upbuilding of a great industrial city and is justly entitled to its share of the honors resulting therefrom.

Separation of Cyanogen from Gas.

At the last meeting of the Society of French Gas Engineers, M. Guillet, of Besançon, read a paper on the topic named in the heading. In it the author noted that he had been experimenting over the matter along the lines marked by Dr. Bueb, who presented his findings at the meeting of the Society, Paris, 1900. M. Guillet's experiments, however, had to be conducted on a comparatively large laboratory scale, as there was no suitable experimental plant at the Besançon gas works. The author, in substance, then went on to say:

The gas, first freed from tar, is passed through a solution of ferrous sulphate. In this solution the ammonia and a corresponding part of the sulphuretted hydrogen are absorbed, forming sulphate of ammonia and black sulphide of iron, which last forms a mud. This sulphide is at the same time attacked by hydrocyanic acid in the gas, and the result is the production of sulphuretted hydrogen and an insoluble ferrocyanide of ammonium and iron $(FeCy_6(NH_4)_2Fe$.

The mud has to be boiled until there is no ammonia given off from it. If there be any left, there is ferrocyanide of ammonium left dissolved in the liquid, and upon filtering off the solution of sulphate of ammonia this salt will, upon crystallization, be mixed with double cyanide of blue color, which will render it unsalable. As the mud comes out of the washer it is greenish black and contains a good deal of ferrocyanide of ammonia, representing about 23 per cent. of the whole cyanogen present. There is a balance between the production of the insoluble $FeCy_6(NH_4)_2Fe$ and $(NH_4)_2S$ from ferrocyanide of ammonia and FeS and the reverse reaction; and the balance is determined by the temperature and the composition of the gas. On boiling, the $(NH_4)_2S$ is driven off and all the cyanogen is driven into the form of $FeCy_6(NH_4)_2Fe$; and as the change goes on, the black sulphide disappears and the black mud takes ultimately a greenish yellow. But the amount of boiling required to get rid of all the volatile ammonia so as to prevent any blue stuff from forming in the sulphate produced is too great for practical working.

The author, therefore, instead of boiling away the $(NH_4)_2S$, adds H_2SO_4. The effect is instantaneous. The black sulphide disappears, and the greenish yellow insoluble ferrocyanide is formed: $(NH_4)_4FeCy_6 + FeS + H_2SO_4 = (NH_4)_2Fe(FeCy_6) + (NH_4)_2SO_4 + H_2S$. The H_2S is boiled out and passed into an alkaline solution. The presence of carbonic acid, if any, is of no importance. The liquid when filtered is a solution of $(NH_4)_2SO_4$, free from cyanogen, but often containing iron sulphate.

When the gas is passed into the solution until the reaction is exhausted, the mud produced is of approximately uniform composition so long as the composition of the gas and its temperature remain about the same; and it is found that the ammonia retained in the saturated mud is from 6 to 7-tenths of the "yellow prussiate" to which the cyanogen retained corresponds. The presence of a sufficient excess of ammonia is, however, an indispensable condition of good absorption of cyanogen, and it must be supplied if necessary. In the gas used it was found that the fluctuations in the quantity of ammonia present very closely followed those of the temperature, there being less ammonia in the gas when the external temperature dropped; and it was also found that the more ammonia there was in the gas the less sulphur there was. It is as if the increase of temperature, under which the ammonia did not condense as well, had a further effect in promoting the absorption of H_2S by the ammonia which was actually condensed before the gas reached the cyanide washer. If that be so, it would tend to explain why the purifiers usually "work better" in summer than in winter; the percentage of sulphur being then smaller, if such be the case.

The solution of sulphate of iron should be a strong one, about 40 per cent. of the salt; this minimizes the need for evaporating the resulting solution of sulphate of ammonia and also minimizes the disturbing effect of the mere bulk of water in acting as a solvent towards the ammonia. It might, however, be useful to use an increased proportion of water where the gas contained a larger proportion of ammonia than was needed. The composition of the deposit so nearly corresponds to the formula $FeCy_6(NH_4)_2Fe$ that when the solution is saturated by the gas, that formula may be used; when the saturation has not been complete the proportions of cyanogen and ammonia are smaller than the formula would indicate. The cyanide washer is a powerful means of removing the last traces of ammonia from the gas; but unless there be an excess of ammonia or, at any rate, a full percentage, we lose cyanogen. The preliminary washing, preferably in weak ammonia water, should be so adjusted as to leave enough ammonia in the gas for the service of the cyanide washer. It is better to regulate the supply of ammonia in this way than to do as Bueb advises, to pass an excess of ammonia right through the cyanide washer and extract it afterwards, for the latter proceeding tends to reduce the lighting power. The state of the gas on its emergence should be watched through glass by means of a moistened strip of litmus paper slightly treated with tartaric acid so as to reduce its sensitiveness. When the solution of sulphate of iron is fresh there will be no need of preliminary washing to remove any ammonia; and it is only when the litmus paper begins to show that ammonia is passing away that the flow of ammonia into the cyanide washer may be held in check by preliminary washing. Then the amount of water in this preliminary washing may be controlled so as just to prevent the paper from becoming blue; and the paper may be renewed every two hours or so. English coal used at Besançon yields cyanides corresponding to 3.28 to 3.50 grains of "yellow prussiate" per cubic foot; and this means that the gas passed into the cyanide washer must contain from 2.3 to 2.45 grains of ammonia per cubic foot. To provide this the amount of preliminary washing may even have to be reduced; and an eye should be kept on the thermometer.

Iron should be kept out of the sulphate of ammonia produced from the sulphate of iron solution employed; and this can be effected by treating the mud with the acid as above indicated in such a way that the sulphide of ammonium present is completely decomposed, and no more. Then the soluble ferrocyanide has been completely transformed into insoluble ferrocyanide and at the same time not a particle of iron has been dissolved. Any excess of acid beyond this will contaminate the sulphate of ammonia with iron. The precise moment is determined by finding when a drop of the mud touched on one side by a drop of perchloride of iron solution and on the other with a drop of red prussiate of potash solution gives no color with either. In practice the acid is added until the red prussiate gives a blue color, and then the mass is mixed with a little fresh mud to bring it back to the neutral state.

There might be a case in which the gas passed through had been in excess and had contained much ammonia. In such a case there would not be enough FeS in the mud to transform the soluble into the insoluble ferrocyanide; and in that event the Fe_2Cl_6 solution would continue, even after the mud had changed color and become orange colored under the influence of the acid, to strike a blue color with it. This can be set right by adding fresh solution of sulphate of iron to the mud until neither of the test solutions strikes a blue color, as before.

When the mud has been brought to this condition, upon filtration the whole of the cyanogen is left on the filter and the filtrate is a pure solution of sulphate of ammonia.

Specimen—Make a solution containing 23.53 grammes of anhydrous SO_3 per liter. Of this take 10 c.c. and put it in a small flask; this quantity will neutralize one-tenth gramme of NH_3. Color it with one or two drops of methyl orange solution; the color will be gooseberry red. Fit in two tubes; one to bring gas down to the bottom of the dilute acid, another to carry the gas forward from the flask to a meter; read the meter, then pass the gas through the flask until the acid begins to turn citron yellow and then promptly shut off the meter. Suppose 37 liters have been passed through; then 37 liters contain one-tenth gramme of ammonia. Two drops, at the outside, of the acid solution should be enough to restore the gooseberry red color; and thus the accuracy of the observation can be readily checked. This method is very rapid and very exact.

A Proposed Reform in Technical Training.

[A paper read by Mr. E. B. Raymond, at the last meeting of the American Institute of Electrical Engineers.]

Those who are called upon to select a man for certain duties, although able to form in their own minds an opinion as to the necessary qualifications, frequently experience difficulty in finding such a person as they require. Most men do not appear to realize that intelligent and conscientious work is the basis of advancement, and that industry guided by intellect is invincible. Although this statement may not be generally appreciated, it is the result of many years of experience in the selection of employees, and applies to college graduates as well as others. This condition of affairs is largely due to early training. Young men who have been reared without due consideration of the economy and self-denial which have enabled their parents to support them while they were being educated, do not take their life work with the necessary earnestness, and are apt to drift along without thought as to whether or not their efforts are tending in the proper direction.

As under existing social conditions there can be no scientific selection of parents, we are necessarily compelled to deal with the problem as it confronts us, so that it is by no means a simple matter to determine the most suitable future employment for a child who has not yet developed any leaning toward a distinctive line of work.

When a boy enters the high school, either parents or teacher should decide upon the line of his life work. It is too early for him to judge of his own natural ability, and it is the experience of the writer that most college graduates fail in determining their proper sphere of action, and this is usually apparent to themselves. It is so seldom that positive tendencies appear in a boy, that his natural ability should be studied carefully, and a decision reached as to his future course.

Some of the great masters of the violin will not undertake to teach a pupil who has passed his eighth year, as they hold that the initial training should begin at that age. The writer believes that a similar rule should apply to engineers, and that this work should be started in the high school.

Supposing that electrical engineering has been chosen, what qualifications are essential to success? The student should possess health, character, courage and intellect. He should be thoroughly impressed with the understanding that work, hard work, constant work, is the absolutely essential foundation for future success.

These conditions refer more especially to young men of average ability. The exceptions, who are generally recognized as men of genius, are exotics, and the ordinary rules of advancement do not apply to them. They soar above their colleagues by reason of their superior fitness, and we admire and honor them for their recognized ability, without attempting to analyze the causes, for we know that to be impossible.

Every man has the ability to do certain things with the best possible results. One of these things is work. But in addition to this we should have trained minds and accumulate knowledge of detail.

There exists in the electrical profession above all others a demand for the lowest grade of work as well as the highest. The engineer should be thoroughly trained in the various lines of practical work, in order to instruct or guide others. He must possess the necessary data, and his mind must be trained to utilize it, in order to make the proper calculations, and predetermine results. While all this is true in any branch of engineering, it is especially so in the electrical, as we cannot rely simply upon judgment and intuition. Something more is required to enable an engineer to design and properly calculate the required output of an induction motor, or determine the phases of cross-currents between alternators, whose prime movers are pulsating in frequency, or hundreds of other cases arising in practice.

To sum up, therefore, we need broadminded men, with intellect, strength, training and purpose. How can we best obtain them? We naturally turn to the college—but how much is asked of it? Men have entered without knowledge of the line of work they are to adopt; often deficiently trained. Their view of life is a fraction with ease and comfort cubed as the numerator, with work to the one-third power in the denominator. To make successful men this fraction must be reversed. If not done in college, it will be done through stress of the duties which the graduate assumes upon beginning his life work. If this training comes too late, another man already seasoned will forge ahead, for the handicap is too serious for a term of active life, none too long at the best.

Our professors, then, should be men of force of character, as well as of intellectual attainments, and the courses at college should be so arranged that recitation rooms and laboratories may be regarded by the students as we look upon our offices.

At this stage of the young man's education it is the writer's idea that details should be put into second place as, at that time of life they are likely to be only superficial.

The technical college should attract by its atmosphere only men with a purpose and so the training must be correctly prepared. Some of our colleges make a poor showing in this respect, possibly from improper organization, failure to reach the individual, or inability to inspire the working spirit. It is the writer's opinion that the colleges should return to the district school principle by stopping elective courses, contracting the list of studies and by encouraging the students to specialize. Then, if the professor is able to get hold of each student personally and instill into his mind the necessity for hard work a long step will have been taken toward the perfect engineering course. The young man graduated from such an institution will go out into the world with a real equipment for successful work in his particular sphere of usefulness.

One of the most essential qualifications of the successful engineer is that he shall be filled with a desire for continual study. Then is the time for him to get his knowledge of real detail, amplifying the general knowledge obtained in college by practical investigation. In short, the college graduate should consider that the knowledge gained at the university is only a start and not a suggestion of a finish.

The writer is a strong advocate of the strictly technical course in the training of electrical engineers. The technical college should drop from its curriculum studies which are likely to be taken up after graduation. The writer believes that such a college will turn out men better qualified for professional work, for when properly trained, the graduated engineer will devote a portion of each week to study and will do this from a natural inclination to study. Details of all subjects that he lacks will be obtained without great effort. As he accumulates money he will naturally turn to political economy and business law; reading will turn him to history and daily writing will lead him to use good grammar and expression.

The chances of success in the case of a man thoroughly grounded in technical information are vastly better than those of the man who has gained general information at the expense of technical training. This point is well illustrated by the wonderful success of many of the most noted men in our profession without college training They had the essential characteristics for success—mind, application and a desire to study—and their success has been the result of those qualifications.

The ideal college, then, would be that which teaches simplicity, concentration and hard work; which discourages all that is superficial; which weeds out the studies that are not essential to the particular course being pursued and devotes all the more attention to those that are essential.

For the boy in the high school who intends to be an electrical engineer it may be suggested that for about 6 weeks of his last two summer vacations at the high school he should work in the machine shop of some manufacturing electrical concern. This will give him very valuable initial experience. During his college course the student in electrical engineering should spend a part of each summer in similar practical work, supplementing it, perhaps, with work in a foundry or pattern shop. The draughting room at college would mean much more to such a man than to the ordinary student.

The writer would suggest, therefore, in line with these ideas, that from college electrical courses, such studies as French and German, rhetoric and English composition, history, English literature and political economy be dropped. One college, to the writer's knowledge, has, besides all these studies, bridge construction, surveying and highway building. In place of the studies discarded, more stress could be laid upon mathematics, physics, mechanics, chemistry, thermodynamics and the laws of electricity. There should be enough of these studies to give him, in addition to mind training, excellent detail knowledge of the subjects studied.

A feature of the college that may be made especially interesting and instructive is the arrangement of frequent lectures or talks by men eminent in their profession. Such men are always willing to give to others the benefit of their own great experience and their talks must be inspiring to the student, even if the lecture is not understood in detail. Such talks are instructive for the professor as well as the undergraduate, giving excellent inspiration by illustrating what has actually been accomplished.

In conclusion, let me say that I do not wish to give the impression that the college is a failure. It is doing wonderful work and deserves great credit, but in electrical engineering education, as well as everything else, there is nothing that cannot be improved upon.

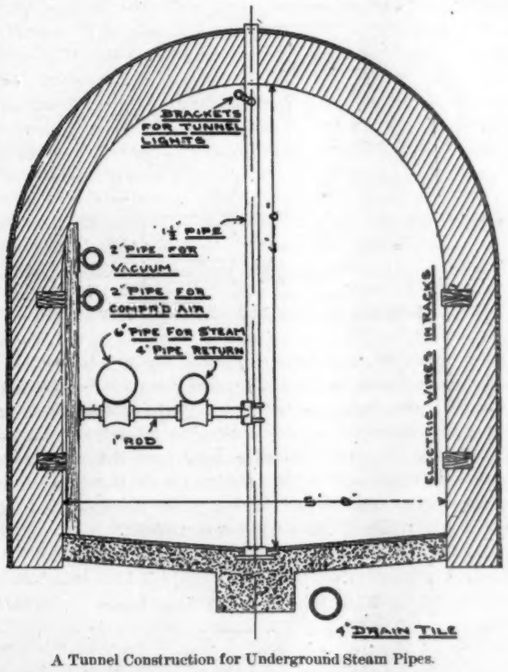
A Tunnel Construction for Underground Steam Pipes.

Mr. G. W. Bissel, in a recent issue of the *Iowa Engineer*, describes a tunnel system designed for the carrying of steam, compressed air, electric light and power from the power station of the Iowa State College to the new engineering hall, and will ultimately be extended to the other large buildings of the college, and will constitute the distributing system for the central heating plant.

The total length of the tunnel is 460 feet, consisting of a single stretch 360 feet in length, with right angle offsets at the power station and the new engineering hall of 60 feet and 40 feet, respectively. The grade of the tunnel is about 6-10 foot to the 100 from each end toward an assigned low point, where a connection is made from the floor of the tunnel to a sewer, and also from a 4-inch drain tile under the tunnel floor to the same sewer, thus securing internal and external drainage. The internal drainage connection is properly trapped.

The construction of the tunnel itself is shown by Fig. 1, which is a cross section.

The walls and roof of the tunnel are hard burned brick, laid up for a 9-inch wall in cement mortar, plastered outside to a thickness of ½ inch with cement mortar. The floor of the tunnel is 4 inches thick, constructed according to the usual specifications for cement sidewalk.



A Tunnel Construction for Underground Steam Pipes.

The extreme height of the tunnel on the inside is 6 feet and the width on the inside is 5 feet.

At intervals of 10 feet in the length of the tunnel a 1¼-inch steam pipe is placed to serve as a column for carrying supports for the heavy pipes. This column is supported by a flange casting at the bottom, resting on a 12 x 12 pier of concrete, and the column is built into the roof of the tunnel, as shown.

At the same intervals (10 feet), and opposite the columns, are placed two wooden bricks on each side of the tunnel. These will serve on one side to support a 2 x 4 cleat, which will carry one end of the pipe carrier, and will serve for ring pipe hangers, as shown, to carry compressed air and vacuum pipes required for operating the thermostatic heat regulation system of the new engineering hall. On the opposite side of the tunnel will be placed a similar cleat, on which the electric lighting and power wires will be suitably hung.

The pipe carrier consists of 1-inch round iron rod, supported by a flange bolted to the cleat on the wall of the tunnel and by a clamp casting secured to the column in the center. The carriers may be adjusted to any height desired to give the pipes thereon the required grade or fall. The pipes rest upon rollers, as shown, which are free to turn upon the round iron rod, thus permitting expansion to whatever extent may be necessary.

The steam pipe will be anchored securely at about 70 feet from each end of the 360-foot section. The expansion between the anchorages will be provided for by the use of expansion joints of standard design. The amount of expansion thus to be provided for will amount to about 5 inches in the extreme case. The expansion occurring on the outside of the anchorage and towards the ends of the tunnel will be provided for by the spring in the offset.

The steam and return pipes will both be thoroughly protected from wasteful radiation of heat by covering them with the best grade of sectional pipe covering. The pressure to be maintained in the steam pipes may be anywhere from atmospheric to 80 pounds to the square inch, but it is not expected that more than 40 pounds to the square inch will be required at any time.

The lighting of the tunnel itself has been provided for by placing overhead a ¾-inch iron pipe conduit, with receptacles and lamps at intervals of 30 feet. The conduit is supported on brackets on the central column, as shown in Fig. 1.

At the present writing the tunnel itself has been constructed, the ends of the long section at the corners being left open for the insertion of the pipe. These openings will be bricked up later.

The cost of the tunnel, including excavation, brickwork, cement work drain tile, iron columns, wooden brick and back filling, was $3,300, approximately $7 per foot. The installing of the pipe, including steam, return, compressed air and vacuum pipes and he hangers therefor, and including the lighting of the tunnel itself, 's now in progress and will cost $1,800, or about $3.90 per foot complete. The total cost, therefore, for the whole construction will probably be about $11 per foot. In comparing the cost of this construction with others frequently used it will be noticed that the same is quite high, but, on the other hand, it is expected that the construction, at least of the tunnel part, will last for all time, and it is reasonable to assume that on account of the accessibility of all the pipe and electric circuits the same will be kept in better condition than they would if hoplessly buried under the ground, and that on account of these features the running expenses due to the radiation of heat occasioned by the deterioration of the insulation will be reduced to the very lowest figure.

Another advantage is in the use of the tunnel for electric light and power circuits. This exists in the fact that the same will be underground, thereby doing away with unsightly overhead poles and wiring system, and doing away with the liability of such overhead wires becoming entangled or blown or broken down.

Disorganized Labor.

By Mr. E. P. Watson, in *Iron Age*.

A portion of the workingmen of this country are engaged in enterprises of their own conception which are opposed to the welfare of the community generally, and have associated themselves under various sonorous titles in attempts to curtail the privileges of other workingmen, one of them being the right to sell their labor in open market to whomsoever will buy it. The disaffected moiety have already inflicted serious loss upon the community in their vicinity and the end in the mining regions is not in sight. Those who claim to be in a position to know assert that the sum of $40,000,000 has already been expended upon the strike of the coal miners without any solution of the dispute. It is plain that it should not be possible for any body of men to cause such commercial disturbances when a preventive for them exists. This is to compel all associations whose ostensible business is to benefit workingmen to take out charters and become incorporated bodies, which can sue and be sued, in the same way that all other companies, banks, insurance, manufacturers, etc., are compelled to, in order that the public shall be protected against loss in dealing with them. If it is necessary that workingmen should have business organizations to forward their interests or guard them against unknown and unspecified enemies, by all means let them be set in operation forthwith under the same auspices that obtain in regular occupations. No one has ever entered a protest or in other ways objected to labor unions with legitimate ends in view, and capitalists have been long suffering in the hope that their employees would see that there cannot be in the nature of things a division of interests, but this expectation has not been realized, and is not likely to be so long as unwise counsels prevail. The choice of head men has not been fortunate in the associations; much more than an ability to make speeches is requisite in leaders of men, for talk alone accomplishes nothing; but out of all the persons prominent in labor associations in the past 25 years not one set his followers in the road that leads to permanent improvement of the conditions which tend to ameliorate whatever hardships appertain to a workingman's life. Not a man of all the counselors has inculcated common sense views of the situation, or told his disciples that there were two sides to every argument, or placed the issues fairly before them. The men have always been told that their side was the only one, and were without defense or preparation for any other aspect of the situation when confronted with it. They have been assured of the support and sympathy of the public when they were acting directly against its interests and causing it to suffer loss and inconvenience in many ways, and there has always been sedulously instilled the idea that labor was in itself omnipotent and could accomplish all its ends and aims by dint of stubborn insistence upon them. Workmen have been told that there is one law for them and another for those who differ from them, but no law at all for those who are entitled to work when and where they please, and they are law makers and law breakers on the whim of the moment. With one face they profess to desire law and order only, with another they would destroy those who "take their places," as if they had titles to occupations they had willfully abandoned. The inconsistencies of the plans, so called, of their leaders, do not seem to occur to them.

Not so many years ago superintendents made lists of "certain lewd fellows of the baser sort," who went about obtaining situations with the sole purpose of stirring up strife and disaffection where they were hired. This was called "black listing," and a great hue and cry was made over it by the men. Now exactly the same course is pursued by them

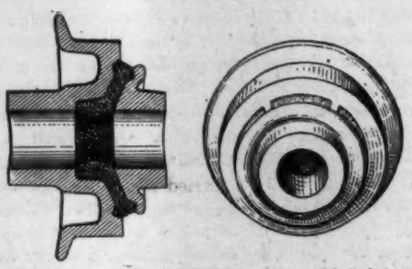
in the "unfair list"—that is, employers who insist upon the management of their own properties without dictation from outsiders, whoever they may be. Arbitration, also, was to be a general penacea for overt acts and encroachments upon either side, but it was speedily ascertained when put to the test that no verdict was valid which did not cede all to the workmen. The failure of all these external applications to cure a chronic difficulty could have been foretold, but they are still evoked in some cases where it is known that they cannot or will not be accepted. One of the causes of the present unhappy position of the coal miners was their demand for an 8-hour day, with, of course, pay for 10 hours. They profess to see nothing unreasonable in this, for all the operators would have to do would be to concede it; but when the operators in their turn demand that the men shall mine 3,000 pounds of coal to the ton (to make up for uncommercial refuse), they, the miners, call on heaven and the public generally to bear witness to the wrong inflicted on them!

The inevitable sequence to following schemes which lead nowhere, to commencing a campaign without plan, means of subsistence, arms or ammunition, is disorganization and defeat, and this is the present aspect of affairs in the coal regions. The strikers were promised that their families would be taken care of if the men would go out. There were 145,000 miners involved, and if any one of them had sat down and figured the amount required to pay only $3 per week to each man he would have found it to be very nearly $500,000. Not all of the miner went out, however, so the sum named would be somewhat less, but in any event it is large. If the strikers had inquired of the treasurer of their society how much of this money was immediately available they might not have been so precipitate in voting themselves out of their jobs.

It is fortunate for the people at large that but a comparatively few workmen have listened to the false doctrines and sophistries of their disorganizers, for, if the number was large, we should all have to sit down and reconstruct ourselves, or others, until we were in accord again. The blind have led the blind and both have fallen into the ditch. The plight of the uneasy element among workmen is certainly pitable upon many counts. They are endeavoring to serve two masters, their unions and their employers, and by far the greatest portion of their allegiance is given to the former. "Their honor rooted in dishonor stands, and faith, unfaithful, keeps them falsely true." Between the devil and the deep sea they know not which way to choose, and not until they cease following after strange gods will they ever win back to the peace and security of the days when there were no leaders to mislead them. There is no country upon the face of the earth where workingmen have the privileges which are accorded to them here; no place where anything like the wages are paid, and a man is what he makes himself. There are none trying to wrest these privileges from them, as they are falsely told, and no other country where equal justice is meted out to all, regardless of wealth, social station or any other condition. It is regrettable that there is a small portion of the people who do not appreciate the benefits secured to them by the Constitution, but perhaps continual and costly defeats in trying to set up their own ideas will turn them from the error of their ways.

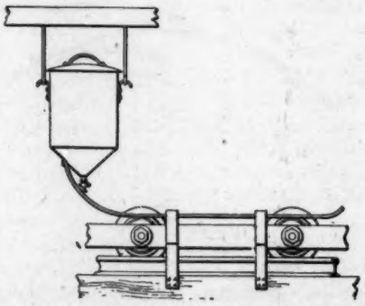
Lubricating the Wheels of Chain Conveyors.

A neat plan for lubricating the wheels of chain conveyors has recently been brought out by the Link Belt Engineering Co., of Philadelphia, and is illustrated herewith. The rapid wear of wheels and rollers on



Section and Perspective View of Roller for Chain Conveyor, with Lubricating Packing.

chain conveyors, particularly where dusty or gritty material is handled, is well known to those who have used them. The difficulty of successfully lubricattng the bearings of these rollers is also well known. To ovorcome these difficulties the Link Belt Companies have devised and



Method of Supplying Oil to Wheels of Chain Conveyor.

patented a wheel or roller having chambers for the reception of absorbent packing, as shown in the section and perspective view herewith.

To keep the packing saturated with oil, at some convenient point on the line of the conveyor, an oil reservoir is placed and its outlet is adjusted to slowly deliver the oil to a long feed rod or wire placed close beside the conveyor, so that the packing on each wheel or roller rubs against this rod as it passes. In this manner continuous lubrication of each and every roller of the conveyor is assured.

Electricity and the Law.

By Mr. Frank P. Medina.

In every country the social institutions act and react on one another in such a way as to affect growth and development. Whatever characteristics the prevailing mode of social activity impresses on the regulating structures, these characteristics influence the evolution of the structures regulated. For instance, where the governmental activities are strongly militant, the institutions engaged in the work of sustaining the society, themselves take on a regimental character. In other words, the various institutions that make up a nation are related to one another in a manner very similar to the organs of an organism.

It is not to be understood that the so-called regulating structures are alone in their influence on social structure in general. It is just as true that the operative structures affect the regulating structures and tend to modify them in conformity with the social necessities.

So the lesson of history teaches that the part of the operative structures called industrial, and the part of the regulating structures called legal, mutually react on each other. The wants and fears of men create them both, and the same wants and fears create the correspondence between them.

The size and importance of an industrial institution are great factors in its influence on the laws. A glance at the state of the common law in the feudal period, when ownership of land practically filled the legal consciousness of property, and at its state when the growth of commerce made personal property more nearly its dominant object, sufficiently shows how closely the characteristics of our laws correspond with the growth and development of an institution which they are designed to regulate. To-day the laws are construed with direct relation to commerce, public policy is directed by regard for it, contracts are interpreted, the laws of descent are restricted, and all the activities of mankind are regulated from motives having their roots in this great institution.

The growth of industries based on various applications of electricity is rapidly bringing them into the front rank of social institutions. The billions of dollars already invested, the enormous number of people directly and indirectly involved, are making electrical industries an institution of the greatest importance, and causing them to occupy a space in the social consciousness second to none.

As the growth of commerce had its effect on jurisprudence, so is the growth of electrical industries having its effect. Its influence may be seen in the great body of statutory law enacted during the past quarter century, regulating the employment of electricity. Witness also the vast number of decisions now extant relating specifically to electrical industries. It has become common to regard the Law of Electricity as a special branch of our general jurisprudence.

The sources of electric law lie in the fundamental doctrines of law and equity. Most of these fundamental doctrines, the results of ages of social experience, are too close to the ideal of natural justice ever to change very much. But the application of these doctrines to a society without electrical industries is a very different matter from their appli-

cation to a people amongst whom electricity has become a prominent social factor. The rise of electrical institutions has modified their application and will continue to modify it, as the new institutions grow in mass, number and variety.

There are three modes of adapting fundamental legal rules to new conditions; by what are called legal fictions, by adjusting them on principles of equity, and by legislation. Legal fictions were much used in ancient times for this purpose, but the modern love of truth and common sense has caused or is causing their abandonment.

The wider the generality of a doctrine, the more closely becomes the restriction of its fitness to average cases. Cases involving circumstances that give them a nature considerably different from the average may not be included in the general doctrine without great injustice. Hence, arose equity, which corrected the application of the general doctrine in ' that, wherein the law, by reason of its universality," was deficient.

But the modern mode of adaptation is by legislation. Through the legislatures of the United States the status of the various electrical industries is becoming fixed, and their relation to the other social institutions and amongst themselves is being more and more clearly defined. It would be very interesting to make a general comparison of the modern application to particular cases of the old rules as modified by legislative enactment, and, as viewed by the courts in the light of modern ideas, with their ancient application to analogous cases, but the limits of this paper forbid it. With special reference to electricity we might note the modification in the law of contracts which makes them valid when made by telegraph or telephone, being a condition of making a contract in which the contracting parties contract neither in the presence of each other nor by writing "signed by the party to be charged." Yet valid contracts, each involving thousands of dollars, are daily made in this manner.

We might further note the modifications introduced by electricity in legal practice as witnessed by such proceedings as service of process by telegraph. It is a matter of common occurence for writs of summons, subpœna, attachment, injunction, to be served in this manner, that is, by service of a telegraphed copy instead of the original writ.

The limits of this paper permit little more than a bare reference to legal questions relating to the telegraph, telephone, electric railway, light and power industries themselves. Their legal relations to one another and to other industries are becoming defined with increasing precision. Some particular legal principles may, however, be touched upon as of special interest.

An electrical company undertaking to do business usually does so under a grant. Now, those whose interest is affected should see to it that this grant is very carefully drawn; for an electrical company "acquires no privileges not directly specified in its grant, or which follow as necessarily incident to the construction and operation of its lines in accordance with the terms of such grant." An instance is given of a telephone company which was granted the right to string its wires across streets and along the tops of buildings, subject to the consent of the owners thereof. It was decided that such right should not be extended so as to confer upon the company the right to erect poles in the streets unless the city consents in express terms thereto.

The power to grant franchises is confined to the legislative branch of the government and does not belong to local governing bodies. These bodies have power to regulate the exercise of the right conferred by the franchise, so far as its exercise affects their local jurisdiction, but the power is confined to reasonable regulation, and does not extend to the right to exclude. And when a local governing body has granted an electrical company the right of the use of streets and the company has constructed its line in compliance with and reliance upon the conditions of such grant, the grant cannot be made the subject of new conditions aside from what may be necessary in the proper exercise of police power and control and regulation of streets.

These matters, however, are not altogether within the scope of the present paper, nor are such matters as the relations of electric corporations to their employees, interferences between the wires of one corporation and those of another, or questions of liability for negligence arising from imperfect insulation. The fact that a large body of decisions exists covering all these matters is sufficient to illustrate the propositions to which it is desired to call attention: That the institutions of a society act and react on one another; that the force of their reaction is in some way proportioned to their mass; and that electrical industries, as they grow in importance, react on jurisprudence in greater and greater degrees. So that we may expect in the future to see our laws so modified that, for instance, the successful working of an electrical concern of the greatest public utility may not be interfered with by undue regard for the safety of a few shade trees on the public highways.

Making Peat Briquettes by Electric Power.

An exchange remarks that the use of electric power in drying peat and manufacturing fuel briquettes is decidedly new. It is now carried out on a large scale at Stangfiorden, in Norway, where a large water power is available for generating the electricity required. The works are described in a recent issue of the London *Engineer:*

The process in use at Stangfiorden differs from all earlier ones in the use of the electric current for carbonizing the dried peat in retorts of special design. It is the invention of P. Jebsen, of Dale, Norway, and the process is patented in Norway and in other countries. The process has been in actual operation at Stangfiorden since 1898, with favorable results. The plant at present installed deals with 100 metric tons of air dried peat per day. The process yields a dense and compact mass after the heating in the retorts. The specific gravity of the carbonized fuel in the broken condition is about 0.30, and the theoretical calorific value about 7,250 thermal units. The fuel burns well and yields little soot and ash.

The power required for carrying out the Jebsen treatment at Stangfiorden is derived from five 80-kilowatt dynamos direct coupled to five turbines of equivalent—128-horse power. The power generating installation was provided by Schuckert & Cie, of Nuremburg, Germany.

The wet peat is brought to the factory direct from the bog by water, in lighters of about 100 tons capacity. The boats are discharged by aid of mechanical power, and the peat is submitted to the first drying and pressing operation. This is carried out in a 5-horse power press which can turn out 2,500 pressed blocks of peat, each measuring 80 by 8 by 8 centimeters per hour. The average weight of dried peat in each of these blocks is 2 kilograms.

The briquettes of pressed and partially dried peat are next loaded into trolley shelf wagons specially designed for tunnel drying by an American company. Each wagon carries, when fully loaded, 140 of the wet briquettes arranged on 10 shelves. The trolley wagons are pushed, when loaded, into the cooler end of the drying tunnel. The air draft which passes through the tunnel is set in motion by fans electrically operated, and is heated by the waste gases from the retorts. The air has a temperature of 90° to 100° C. at the top end of the tunnel where the wagons emerge, and one of 40° to 50° C. at the lower end where they enter. As the wagons pass up the tunnel, the peat is, therefore, submitted to a gradually increasing temperature. The drying plant at Stangfiorden comprises one hot air stove, three electric fans, two tunnels, and 102 shelf wagons; 100 tons of air dried peat blocks can be produced per day. The wagons with their charges of dried peat are next taken on tram rails direct into the retort house, and are emptied directly into the retorts.

The retorts are upright cylindrical vessels of iron, about 2 meters in height and 1 meter in diameter. Each retort has a removable cover, and a discharging hole below, and is in addition provided with gas exit pipes and a pressure gauge. The retorts are provided with spiral resistance coils of special construction, and the blocks of peat are built up in actual contact with these, until the retort is entirely filled with a pigeon holed mass of peat, in the center of which the heating agent lies. The top cover of the retort is now clamped down, and the electric current connections were made. Losses by radiation are minimized by lining the retorts with asbestos. The peat yields three products when submitted to this electrical heating in closed retorts. The gaseous products pass away by openings in the retort cover, and after scrubbing are employed for heating the air used in the drying tunnels. The tarry liquid condensed in the gas pipes and in the scrubbers contains tar oils, ammonia and other compounds, and if the plant and technical skill are available, may be worked up for these products on the spot.

The peat fuel remaining in the retort after the carbonizing operation is completed is allowed to cool down to 130° C. before opening the retort, and is then discharged direct into wagons running beneath the retorts. The peat fuel produced at the Stangfiorden factory is shipped direct to Bergen, where it is said to meet with a ready sale. The average yield of 100 kilos. of the air-dried peat at Stangfiorden is as follows: Peat fuel, 33 per cent.; peat tar, 4; tar water, 40; gaseous products, 23 per cent.

The by-products obtainable from the peat tar are gas oil, creosote and paraffine; from the tar water they are methyl alcohol, sulphate of ammonia and acetate of lime.

It is said that negotiations are in progress for the introduction of the Jebsen process into Ireland, in connection with the development of one of the water powers on the West Coast. Mr. B. Horsky, of Prague, Bohemia, is the European representative of the Jebsen process.

The Petroleum Situation in South Alabama.

C. F. Caracristi, C.E., in referring to the matter named in the heading, declares that the Gulf district of Alabama is attracting much attention as a presumptive oil field. Work has been in progress for some months and although the wells in the Citronelle, St Stephens and Jackson's Creek region have been abandoned, none of them have reached a sufficient depth to determine the actual productiveness or barrenness of the Eocene formations traversed. It is deplorable and even discouraging to the actual investor that such failures have succeeded each other in rapid succession, but when we stop to consider that the work has been carried on by amateurs, these failures are not sufficient to condemn the field, but serve to point out and emphasize the fact that knowledge in the petroleum business is one of the prerequisite essentials to success. A new start has just been made at Citronelle, and St. Stephen's will probably soon put down a well under the direction of some oil specialist of repute. Near McGraw's Shoals, where my clients have been quietly operating for 2 months, the work has been progressing with all due speed consistent with perfect safety. I am told that the millionaire baking powder magnate, J. B. Rose, of Chicago, is about to drill some wells on his property on the Tombigbee River.

The excitement is nearly dead and the more conservative element is now working up what will most likely be the results. To me, who am in the oil business to stay, it is always a pleasure to attend the burial, even though it be as pall bearer, of idle speculative booms, which nearly always retard or at least hamper conservative development in any branch of the mining business. The total loss by failures to finish wells in this district, including incidental expenses and salaries, amounts to about $18,500, but as the leases held by the various failing interests practically cost them nothing, the value of these rights more than counterbalance the losses. I am not discussing in this article the holding of the two larger private interests which dominate the field.

A consolidation of interests has been mooted for some time, and I feel confident that a co-operative community of actual values will be perfected the moment the speculative tide is wholly passed. Until then there is nothing which trained business men would consolidate, because it would be impossible to unite on an equitable adjustment of property values.

The facts are that we are all awaiting what the other man is going to do, while land leasers are trailing the country as thick as book agents in New York with the hope of selling their leases if some one strikes oil.

This element does not stop to realize that even if oil should be struck they would never learn of it until long after their leases would have expired. People of means and versed in the petroleum business do not make it a rule to make values for others and I believe that this field will not be an exception.

But why all this talk when no one has actually informed the world that oil does exist, and that he has actually tested it? I have been to visit so-called seepes; some I found to be iron, others sulphur, and one a fair grade of Beaumont oil. All that it lacked was an express label to tell who sent it.

Outside of the visible existence of surface oil itself, there are indications which to the expert eye warrants the expenditures necessary to drill wells when intelligently located and drilled. Everyone knows that there is a great degree of the element of gamble in the oil business at its best. Oil may or may not be found here, but I think the gambling chances are good.

As this article is written by a professional man, it is naturally out of the boom style, yet I have said enough to encourage investment.

Mechanically Separating Tar and Liquor.[1]

The difficulties experienced, even with a considerable amount of rest, in separating ammoniacal liquor from the tar with which it is incorporated—especially when the tar is the product of the distillation of coal at a high temperature, and is consequently thick and wanting in fluidity—are well known to gas managers. If it is to be distilled, the operation is sometimes very difficult, owing to the liquor held in suspension, which necessitates the use of extra fuel; while if it is employed for painting ironwork, the liquor causes oxidation of the metal. At the last meeting of the Société Technique, M. Burguière described the Hignette turbine, by the use of which it is possible, according to him, to free the tar from nearly the whole of the liquor. The following is a brief account of the appliance: A cylindrical receptacle, supported and worked on a vertical shaft, is filled with the tar, previously heated to 40° C. by means of a plunger pipe fixed in the central part. This vessel revolves at the rate of 2,400 revolutions per minute. Four vertical blades, placed in the direction of two perpendicular planes, are fixed on the circumference of the receptacle, but without touching it. The liquor carried away by the blades acquires in an instant the speed of the vessel, and assumes the form of a ring, the inner part of which is composed of the light, and the outer part of the thick or heavy liquid. Two pipes are placed in these two positions on the lid of the vessel, through which they run, and are bent at right angles immediately below, so as to present their mouths in the opposite direction to the flow of the liquor. The result is that under the influence of centrifugal force, the tar and liquor are discharged in two different directions in the form of jets moving at very great speed. The tar is thus freed from the liquor to the extent of containing only 1 per cent.

The turbine which has been put up at the Marseilles gas works is equal to treating about 16 cwt. of tar per hour, but projection of the heavy molecules against the sides of the vessel favors a deposit upon them of small particles of soot, which imperceptibly thickens, until, owing to the circulation of the liquor round the blades being impeded, a general cleaning of the apparatus becomes necessary. This takes nearly an hour, and immediately afterwards a fresh operation can be started, which lasts about 2 hours. It may thus be reckoned that the amount of tar treated in 10 hours will be about 6 tons 8 cwt. The man who attends to the tar and liquor can also do this work, at an increase of wages. The extra expenses are then confined to the fuel employed to drive a small 5-horse power engine and a tar pump. The author estimated the cost at about 3 frs. per working day of 10 hours, or 47 c. per metric ton (2,200 pounds) of tar. The quantity of liquor recovered is considerable enough to be mentioned. The turbine removed about 11 cwt., from which 22 pounds of ammonia could be extracted.

The general plant comprises a small shed (large enough to contain two turbines); one turbine; a tar tank in which a steam worm raises the temperature to about 40° C; a tank to receive the tar after treatment; a 4 to 5-horse power engine; and a pump to drive the tar into the general storage tank. The total cost was 6,600 frs. ($1,320).

1. *Journal of Gas Lighting.*

Boiler Bracing.—No. I.

By W. H. Wakeman, in *Electricity.*

Boilers that are designed so that no braces are required, are undoubtedly stronger than those in which it is found necessary to use stay bolts, braces, angle irons and other supports, but it is impossible to dispense with these in modern boilers carrying high pressures, except in some of the sectional or water tube forms, therefore it becomes necessary for the competent engineer to understand the principle on which the theory of boiler bracing rests, and when applying this theory to general practice in installing and caring for a plant, he must see that braces are properly made, located and kept in repair.

The shell of a plain cylinder boiler needs no bracing because it is made in the strongest form possible, which is a true circle practically. If the shell was made in one piece, or if each sheet in length was made in one piece, without seam, it would be possible to make the circle absolutely true, but where a sheet is lapped to make a joint, the truth of the circle is destroyed and an element of weakness is introduced, but it is not great enough to prove serious.

With a double welt butt joint this is eliminated, hence this is a trifle stronger than a lap joint, even if both were designed so that the theoretical calculation shows that they are alike.

The head of a plain cylinder boiler may be designed so that no braces will be required, for if it is "bumped up" until the rise is one quarter of the diameter, it will be as strong as the shell, provided both are made of the same material.

The circular form of the shell in a plain cylinder boiler is retained in all others, and probably always will be, but the use of flues and tubes makes it necessary to retain the flat head although it is a weak part of the structure, as it is not practical to expand these circular forms into a head made in any other shape.

Taking for illustration an ordinary tubular boiler in which the upper row of tubes are above the center line of head, it will first be noted that as a hole is cut for each tube, much of the surface is removed, and this, of course, makes the surface on which steam pressure can act less accordingly.

As the tubes are expanded into the head they form braces that are

very efficient, therefore if the tubes in a boiler extend down to within 6 or 8 inches of the shell on the bottom, no braces are necessary below the tubes.

Many engineers prefer a boiler in which a portion of the bottom rows of tubes are omitted, so that a manhole can be located in the front head at this point. This provides a solid body of water above the crown sheet where the greatest heat affects the boiler. It also affords room to clean the crown sheet and make necessary repairs.

In this case braces must be supplied to hold the heads, in lieu of tubes that are omitted. For all ordinary conditions two braces of round iron 1½ inches in diameter are sufficient for 100 pounds pressure.

The space to be held in this way is no larger for a 72-inch head than for one only 48 inches in diameter, therefore the above general rule applies to all cases found in ordinary practice.

It was formerly customary to extend these braces from one head to the other, which form provides for a direct pull on the rods, as they stand at right angles to the heads. Another advantage of this form is that no rivets are driven in the lower part of shell to hold the braces. This feature does away with the necessity of anchoring braces to the shell, which causes a double thickness of iron or steel to come between the fire and the water, thus preventing heat from passing quickly through the metal and increasing the danger of burning it.

The disadvantages of this plan are that the long braces are in the way when a man must go inside to inspect or clean the shell, and after they have been in use for a few years they frequently become so thoroughly crystallized that they have but little strength. In some cases a smart blow with a light hammer will cause one of them to drop into two pieces. A space must be left in the upper part of boiler for steam to separate from the water, and this makes it necessary to omit tubes and flues at this point. This in turn leaves a comparatively large space unsupported by any part that this is essential to steam making, and makes it necessary to put in braces especially to hold the flat head, for as soon as any part is changed from the form of a true circle, and pressure is applied, it seeks to go back to the circle, and will go unless strongly held.

Engineers have shown much interest in the calculation necessary to be made in order to determine the number of braces required in such a case, therefore the principles on which it is founded will be given here and careful attention to them will enable the reader to apply the same to any case that is found in practice.

For all ordinary heads on stationary boilers which are nearly or fully ½-inch thick, the head is self supporting for a distance of 2 inches above the tubes, also for 3 inches from the shell. The space within these lines is the segment of a circle, which it is necessary to find the area of, in square inches. The diameter of circle is 6 inches less than the diameter of boiler, and to find the height of the segment, measure from the top of tubes to the shell and subtract 5 inches from it.

This gives the diameter of circle and height of the segment. To find the area of this, divide height by diameter. Refer to a table giving "Areas of Segment" and opposite the quotient as above found note the areas in the next column. Multiply the area by the diameter of circle squared, and the product is area of segment.

For illustration, suppose that the boiler is 66 inches in diameter, and it is 27 inches from tubes to shell. The diameter of circle is 60 inches, and the height of segment is 22 inches, according to the foregoing rule.

Then $22 \div 60 = .366$, the area of which according to table is .26032 and when this is multiplied by the square of diameter we find that $.26032 \times (60 \times 60) = 937$ square inches.

This table is not inserted here because it would occupy too much space. It will be found in standard engineers' pocket-books.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

At the annual meeting of the shareholders in the Medina (N. Y.) Gas Company the officers chosen were: President, Mr. John C. Murphy; Treasurer, Mr. George W. Graves; Secretary, Mr. William R. Curry. The reports of the officers proved that the Company's affairs are in a very prosperous state, and the output returns for the twelvemonth showed a decided gain over those reported for the previous year.

The following letter (it was received too late for printing in the Journal for last week) explains itself:

Morristown, N. J., July 9th, 1902.

To the Editors American Gas Light Journal: In the interest of a correct report of the proceedings of the Western Gas Association's meeting, held last May in New Orleans, La., pardon me for calling attention to several discrepancies which it is hoped you will kindly set straight. On page 882, June 16th number, at the end of my remarks descriptive of Mr. George H. Brown's Wrinkle, you quote Mr. Norris as saying something; but do not state all that he said. To what was printed should be added, "How do you account for these pipes going to the retort stopping up?" Then to this Mr. Egner, not Mr. Goodnow, replied: "I account for it by the presence of carbonyl of iron formed by the passage of the raw water gas through these hot pipes." To the best of my recollection Mr. Goodnow said nothing at all just then; but if he did the noise of the electric lighting annex of that New St. Charles Hotel, near the room in which the meeting was unfortunately held, drowned every other sound, and he could not be heard by the stenographer, which was the case with many other speakers. It is only a wonder that you did get the report as straight as you did, under such adverse conditions. But another correction, made necessary by a misprint, is not so easily excused. In my paper on "The Latest about Inclined Retorts," etc., you omit, on page 955 of the June 30th number, one little word—the word *not;* and that omission completely alters the sense of that which I wrote and meant to be distinctly understood. The passage in question reads: "And after becoming converted to its utility finally [*not*] adopting it." The *not* was left out by you, and it should be there to correctly reproduce what I read, what was printed in my paper, and that which truthfully describes the actual condition of the subject as I put it.

Very respectfully, Frederic Egner.

The King of England has bestowed upon Mr. George Livesey, Chairman of the South Metropolitan Gas Company, of London (a man whose fame as a gas engineer and manager is world-wide), the degree of Knighthood.

According to the official records, Mr. J. Edward Addicks has been superseded as President of the Bay State Gas Company, of Delaware, by Mr. J. Frank Adlee, of Dover, Del. The other officers, all of whom reside in New Castle, Del., are: Vice-President, James F. Shaw; Treasurer, W. H. Miller; Secretary, John F. Donohue.

The Lowe Coke and Gas Securities Company, of New York city, to manufacture coke and coal gas, has been incorporated in Dover, Del. It is capitalized in $30,000,000.

The capital stock of the Dayton (O.) Gas and Coke Company is to be increased from $800,000 to $900,000. The added capital is to be offered to shareholders of record, pro rata, at par.

The Springfield (Mass.) Gas Light Company has inaugurated a novel contest. It has invited the members of the graduating classes for the current year from the public and parochial schools to prepare and submit essays on "The Advantages of the Gas Range." Several prizes are to be distributed to the preparers of the best essays, the first prize being, at the option of the successful one, $200 in cash or a trip to Europe. The essays were to be handed in last Saturday, and they are to be reviewed by three judges (Mr. Henry G. Chapin, of the Chapin & Gould Paper Company; Mr. Edward Pynchon, Cashier of the Chicopee National Bank, and Mr. W. B. Walker, of T. M. Walker & Co.), whose decision is to be final. When the papers go to the judges each paper will be marked by a number, so that the judges will not know the names of the essayists.

Work on the ges plant for Shenandoah, Ia., will be commenced within a fortnight. The corporate name of the concern is that of the Peoples Gas Company, and its executive management is: President, George W. Leidigh; Vice-President and Manager, C. J. Hayes; Secretary, E. R. Ferguson; Treasurer, Frank Anshutz.

An assessment of $5 per share on the stock of the Economist Gas Engine Company, of San Francisco, has been declared. The date of delinquency is set for the 8th prox.

The offices of the Fresno (Cal.) Gas and Electric Light Company have been removed to 1034 J street.

In the reorganization of the Evansville (Ind.) Gas and Electric Light Company the following officers were chosen: Directors, Francis J. Reitz, R. H. Dunkerson, Chas. Heilman, Edward B. Lewis, Martin A. De Vitt, George G. Olmstead and John H. Sonntag; President, Ed. B. Lewis; Treasurer, Henry Reis; Secretary, Jas. H. Foster. The Company will expend a large sum in reconstruction.

THE extension of the Bangor (Me.) Gas Company's mains to the outlying village of Brewer has resulted in a very satisfactory increase in output.

THE offices of the Boone (Ia.) Gas Company will be removed to the Wells Building, where spacious counting rooms and showroom for the display of gas cooking and heating apparatus, improved burners, etc., are being prepared.

THE Albion (N. Y.) Power Company has purchased the plant and franchises of the Albion Gas Light Company.

AT a meeting of the Directors of the New Britain (Conn.) Gas Light Company Mr. A. J. Sloper was elected President, vice the late Mr. Jas. Eddy, and Mr. Harold T. Sloper was elected Secretary.

A CORRESPONDENT forwards the following, from the Flushing (N. Y.) *Journal*, dated the 5th inst.: "Last Wednesday was the 36th birthday of Mr. Chas. G. M. Thomas, General Manager of the Newtown and Flushing Gas Company. To commemorate the event the employees of the Company presented Mr. Thomas with two handsome pictures, representing moonlight scenes in Switzerland. The pictures are photographs, 24 by 27 inches, with the natural colors reproduced. The pictures are set in walnut and gilt frames. The presentation was made by Superintendent Fogg, who read the following, a copy of which was presented to Manager Thomas:

"'To Mr. Charles G. M. Thomas, Vice-President and General Manager of the Newtown and Flushing Gas Company: It is with some hesitancy, and yet with much pleasure, that we bid you pause in your round of daily activity in order that we, the employees of the Newtown and Flushing Gas Company, may have an opportunity to extend to you our hearty congratulations on this, the 36th anniversary of your birth, as well as to extend to you our best wishes for your continued success in every department of life. We trust that you and yours may be blest with length of days and good health, and your cup of happiness may always be filled to overflowing, and that a goodly portion of those things which add to our comfort and material welfare may be yours, and in all your walks through life that you may have the ever present sense of the abiding presence and guidance of the all-wise Creator and giver of every perfect gift. Realizing that time brings changes, and that in days to come those qualities which have already won for you success, will be employed in larger fields of usefulness, where new faces meet from day to day, we have endeavored to put in a material form our expressions of appreciation, loyalty and kindly feeling, with the hope that when we shall have passed out of your daily life, we may in future years still have a part in your memories of bygone days. And so when you chance to gaze upon these tokens of our appreciation and loyalty, you will also see portrayed what is symbolic of those qualities possessed by you and admired by all who know you. The tall and stately mountains standing out in boldness and grandeur reminding you of the strength of character upon which your life and success are founded; the stability and integrity which make it possible to enjoy the full confidence and respect of those whose interests are in your keeping, and yet not removing you from manifesting an interest in the welfare and happiness of those in your employ. And so when you catch a glimpse of the water, and think of its never ceasing ebb and flow, it will call to mind your untiring energy, that has won for you success which many of maturer years have failed to attain; while the clouds standing out in bolder relief because of their silver lining, suggesting the hopefulness of your nature, making it possible for you to see the bright and hopeful aspect of every situation however dark and formidable it may seem, and which, together with your untiring energy, have made it possible to surmount barriers that to others were insurmountable. And, lastly, the bright spots on the canvas, the trees, the foliage and the finishing touches which go to make the picture complete, will suggest your sympathy, kindness, thoughtfulness of others, and a host of kindred attributes which can only emanate from a heart overflowing with goodness. These qualities have endeared you to all those who are in your service, and who can say that service under you is drudgery?

'May love surround your path each day,
Success and joy attend your way;
May your sorrows be but few,
And fade away like morning dew.
May this your anniversary day
Be but one of many along life's way;
And each passing year have in store,
Blessings richer than those gone before.'"

AT the annual meeting of the Milwaukee (Wis.) Gas Light Company the following officers were elected: Directors, E. McMillin, W. F. Doutthirt, E. G. Cowdery, S. M. Green, F. G. Bigelow, H. A. Luedke, A. E. Smith, J. P. Murphy and H. C. Payne; President, Emerson McMillin; First Vice-President and General Manager, E. G. Cowdery; Second Vice-President, S. M. Green; Secretary and Treasurer, S. J. Glass. In speaking to the reporters of the daily newspapers, respecting the standing of the Company and the growth of its business, Mr. Cowdery said: "Our business has increased in greater ratio for the past year than in any other preceding year, and this increase shows that Milwaukee has had a greater growth than in many previous years, and the Company will now push work on the new plant as rapidly as possible. The plant will surpass any in the United States in perfection of equipment and economy of operation, and it will compare favorably with any other in the world. The new plant will have a capacity of turning 1,000 tons of coal a day into gas, which illustrates its size better than anything else that could be said. I do not believe that there will be any increase in the price of bituminous coal over what it has been. I do not refer to the price paid by the consumer, for we buy our coal directly from the mines. But as to increasing the price of gas, 2 years ago the materials we put into the manufacture of gas, coal and oil cost us $150,000 more than they did in previous years. There are only two ways that we could recuperate ourselves from a loss of that kind, and neither is by raising the price of gas. We either try to increase the consumption of gas by extending our territory, or we increase the returns from our residual products, such as tar, coke and ammonia. It would be a very unusual state of affairs whereby it would be necessary for us to increase the price of gas, and I can safely say that it would never be done."

THE Hudson (Mass.) Gas Light Company, the proprietors of which intend to distribute gas in the named place, have appealed to the Board of Gas and Electric Light Commissioners for the right to issue $25,000 of original stock.

A CORRESPONDENT in Boston incloses the following: "A temporary Board of Directors for the Boston, South Boston, Roxbury and Bay State Gas Companies, of Massachusetts, has been chosen as follows: J. D. Richards, H. B. Chapin, H. E. Townsend, C. G. Smith, Neal Rantoul, S. R. Anthony and W. S. Spaulding. These gentlemen all represent the Kidder-Peabody interests, and were chosen as a result of the recent decision of Judge Knowlton, in the case of Manning v. Boston Gas Light Company, under which the election of a new Board of Directors was allowed. The Board named Mr. J. L. Richards as President."

WE regret to report the death of Mr. Newberry Updyke, who was Superintendent of the Bristol (Pa.) Gas Light Company since 1883. His death occurred at his home in Bristol, the morning of the 4th inst. Deceased was born in Upper Black's Eddy, Pa., July 24, 1856, and became a resident of Bristol in 1882.

THE Directors of the Lebanon (Pa.) Gas Company have declared the usual semi-annual dividend of 4 per cent. It has been payable at the Company's office since the 15th inst.

THE Elkton (Md.) Company has arranged for the construction of a new holder. The plan of improvement includes a liberal extension to the main system.

MR. GOTTFRIED FALKENSTEIN, Manager of the plant at Cooperstown, N.Y., is concerned in the construction of a gas works for Montpelier, Vt.

AT a meeting of the Stillwater (Minn.) Gas and Electric Company, Mr. L. E. Torinus was elected to the vacancy on the Board caused by the death of Capt. A. T. Jenks.

THE proprietors of the Waterloo (Ia.) Gas and Electric Company have formally accepted the terms of the trade whereby the plant and franchises of the Cedar Falls Electric Company go to the first named concern.

Electricity notes that at a recent meeting of the Midland Institute of Mining Engineers in England, Mr. E. Brown read a paper on "An Apparatus for Lighting Miners' Safety or other Inclosed Lamps by Electricity." As described in the London *Electrician* a metallic conductor was fixed in the glass surrounding the wick of the lamp, which was lighted by placing it on a stand having a battery and induction coil inside it. Contact plates were arranged on the top of the stand, and by pressing down the lamp the primary circuit of the coil was closed, causing a spark to pass between the conductor in the glass and the wick tube, this being sufficient to light the wick. It was possible by this arrangement to light an ordinary safety lamp without passing a conductor through the bottom.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,

PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,

EDITORS.

CHAS. E. SANDERSON,

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PACIFIC COAST GAS ASSOCIATION

Notification Respecting Advertising.—Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JULY 21, 1902.

The Market for Gas Securities.

There was quite some trading in local gas shares during the week, the bulk of the transactions, of course, going to Consolidated. The dealings, which were on a fairly large scale, were all done at firmer figures than those that have been recorded for some time back. The close to day (Friday) was made at 224½ to 225. The old rumors respecting the Company's future relations with or toward the Brooklyn Union Company were again retold with renewed emphasis.

Brooklyn Union was featureless, unless dullness and strength may be considered such. The people most interested in the merging of the lighting interests in the two largest boroughs of New York city should remember the fact that the owners of the Brooklyn Union Company are not to be humbugged into dividing any portion of the ultimate profits of their property with the controllers of the electric lighting supply of Kings county. The outside gas share market is strong. Peoples, of Chicago, is at 103 to 103½, and Washington (D.C.) gas is 357, bid. The Company has declared a regular quarterly dividend of 50 cents per share, with an extra dividend of $1 per share. Consolidated, of Baltimore, is steady, and the same may be said of Cincinnati Gas and Electric, which is 102½, bid. Columbus (O.) Gas and Heating, preferred, is 107½, bid. The 5 per cent. gold bonds of the same Company are quoted at 108 to 110.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JULY 21.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	224¼	225
Central Union, Bonds, 5's.	3,000,000	1,000	110	112
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	350	..
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	112½	113
Northern Union, Bonds, 5's.	1,250,000	1,000	108	110
New York and East River.. Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	..
Standard	5,000,000	100	130	140
Preferred	5,000,000	100	150	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	117
Yonkers	299,650	500	180	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	232	241
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	1¾	2
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works..	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	11	13
" " Bonds, 5's	5,250,000	1,000	83½	84¼
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co..	29,500,000	100	102¾	103
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	108	109
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89½
Preferred	3,026,500	100	107½	109
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore..	11,000,000	100	69	69¼
Mortgage, 6's	3,600,000	..	..	115
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	.	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	85	87
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,825,500	50	.	89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	382,000	1,000	77	79
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	.	.
" Bonds	2,000,000	..	58	63
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	70	80
" Bonds, 6's	2 650,000	..	102½	104½
Jackson Gas Co.	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	89
Preferred	2,500,000	100	..	110
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	53	64
Louisville	2,570,000	50	112	120
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	300	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	103	103¼
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	43	43½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's.	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	93	96½
Syracuse, N. Y.	1,975,000	100	24½	28
Bonds	2,047 000	1,000	86	90
Washington, D. C	2,600,000	20	357½	362
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	109½	110
Wilmington, Del.	600,000	50	232	..

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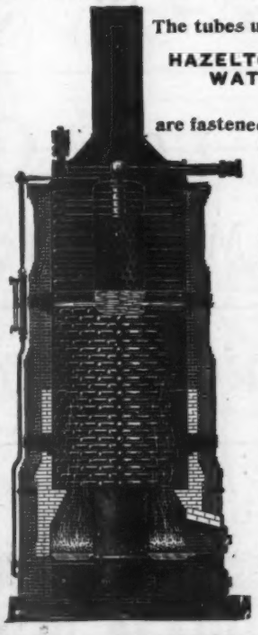

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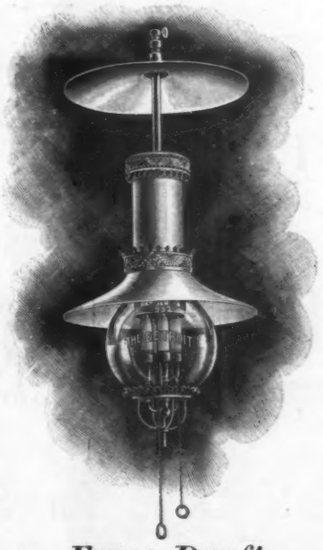

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No Matches Necessary.
Consumes Less Gas.
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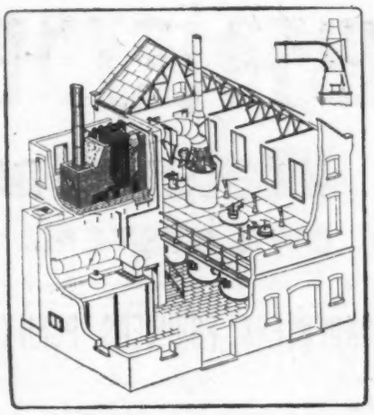

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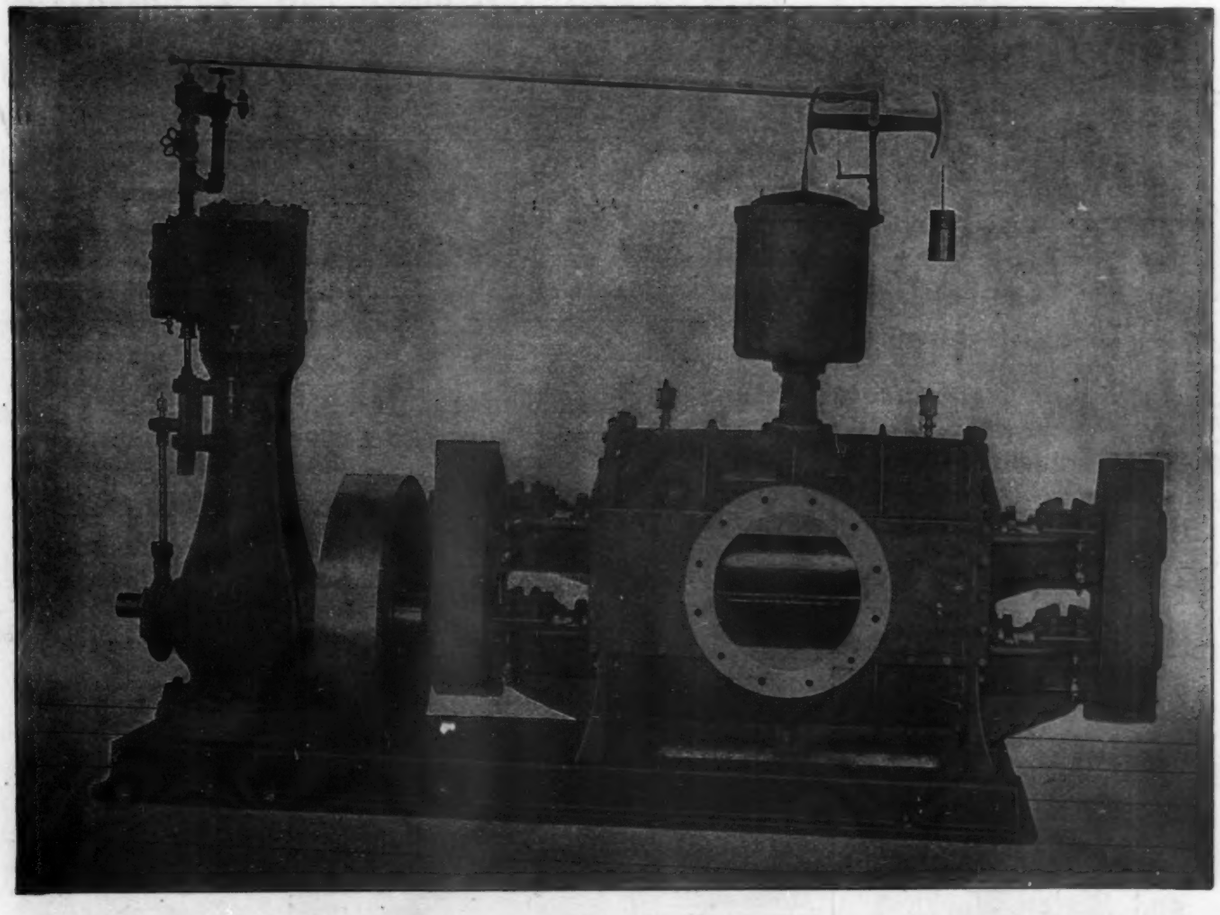

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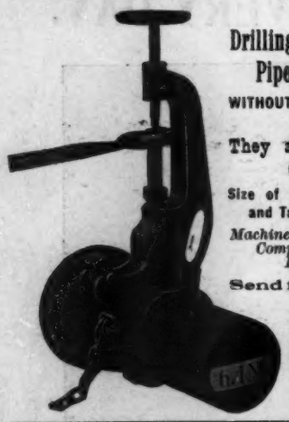

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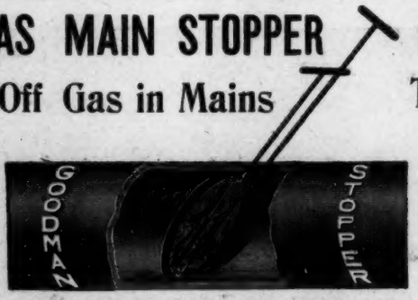

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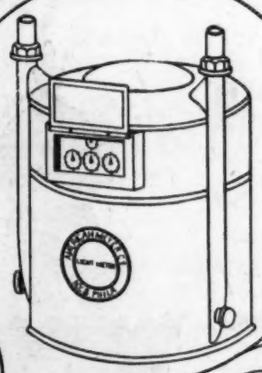

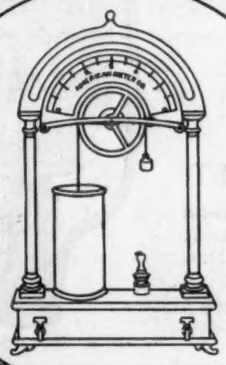

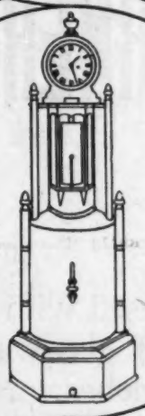

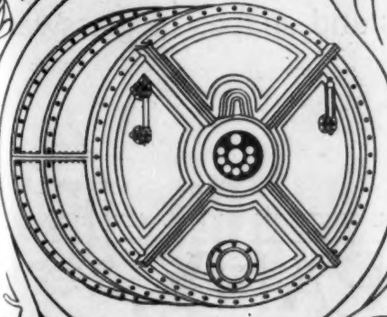

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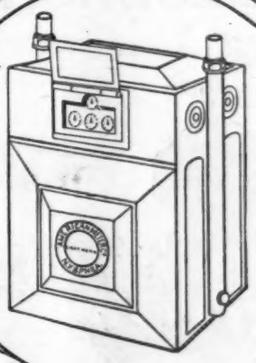
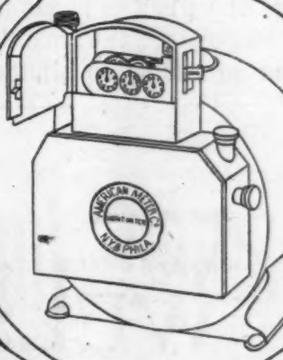




PUBLIC LIGHTING TABLE.

AUGUST, 1902.

Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Fri.	1	7.50 PM	4.00 AM	7.10	3.30
Sat.	2	7.50	4.00	7.10	3.30
Sun.	3	7.40 NM	4.00	7.10	3.30
Mon.	4	7.40	4.00	7.10	3.30
Tue.	5	7.40	4.00	7.10	3.30
Wed.	6	7.40	4.00	7.10	3.45
Thu.	7	7.40	4.00	7.10	3.45
Fri.	8	8.40	4.00	7.10	3.45
Sat.	9	9 20	4.00	7.10	3.45
Sun.	10	9.50 FQ	4.10	7.10	3.45
Mon.	11	10.30	4.10	7.10	3.45
Tue.	12	11.10	4.10	7.10	3.45
Wed.	13	12.00	4.10	6.55	4.00
Thu.	14	12.50 AM	4.10	6.55	4.00
Fri.	15	1.40	4.10	6.55	4.00
Sat.	16	2.40	4.10	6.55	4.00
Sun.	17	No L.	No L.	6.55	4.00
Mon.	18	No L. FM	No L.	6.55	4.00
Tue.	19	No L.	No L.	6.55	4.00
Wed.	20	7.20 PM	8.20 PM	6.45	4.10
Thu.	21	7.20	8.50	6.45	4.10
Fri.	22	7.20	9.30	6.45	4.10
Sat.	23	7.20	10.00	6.45	4.10
Sun.	24	7.10	10.40	6.45	4.10
Mon.	25	7.10 LQ	11.30	6.45	4.10
Tue.	26	7.10	12.20 AM	6.45	4.10
Wed.	27	7.10	1.20	6.30	4.20
Thu.	28	7.10	2.20	6.30	4.20
Fri.	29	7.10	4.20	6.30	4.20
Sat.	30	7.10	4.20	6.30	4.20
Sun.	31	7.00	4.30	6.30	4.20

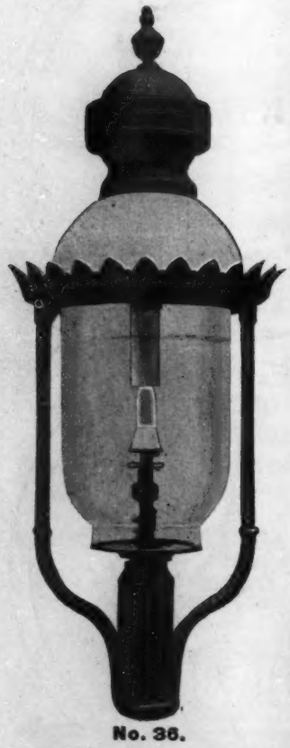
TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	238.30	January	423.20
February	196.20	February	355.25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280.25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45

NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



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Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

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POINTS OF MERIT:

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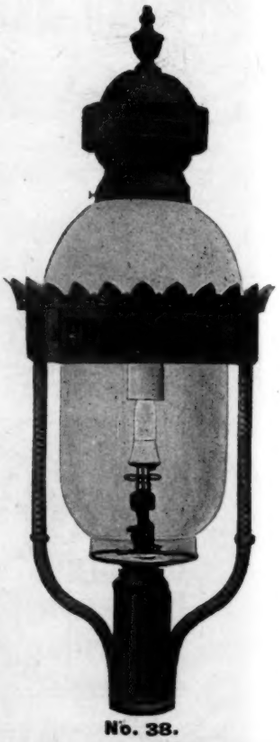
IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others Interested in Municipal and Outside Lighting.



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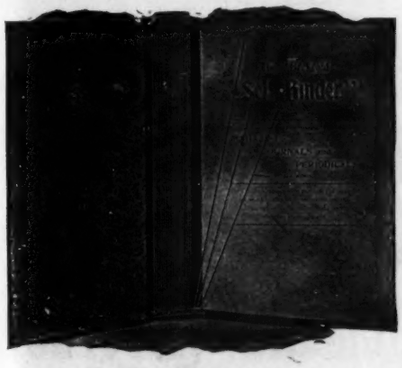

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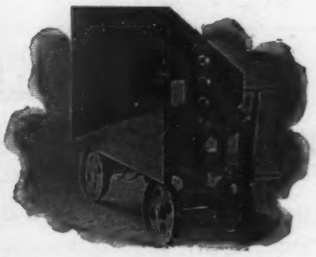

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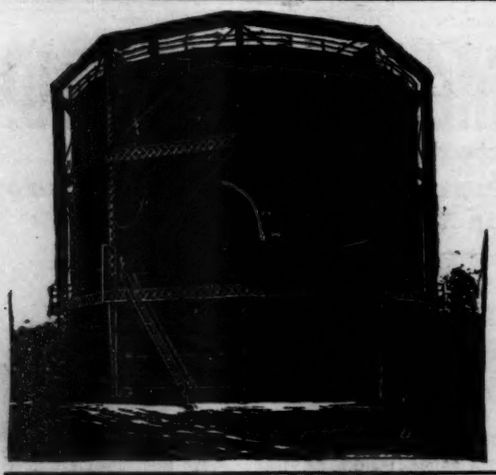

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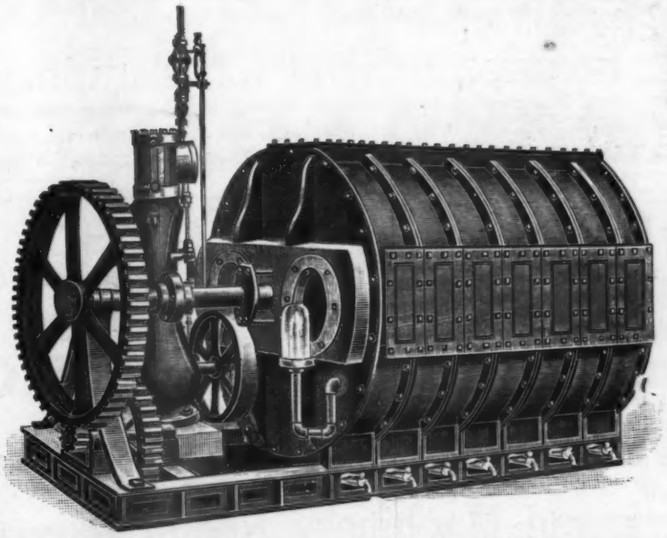

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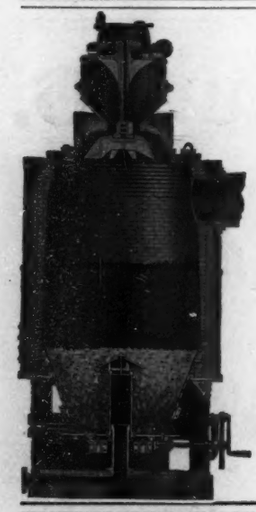

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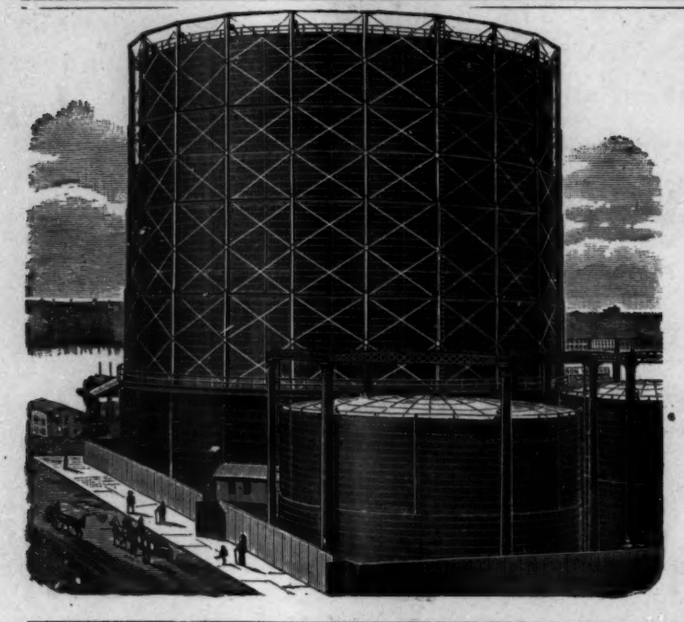

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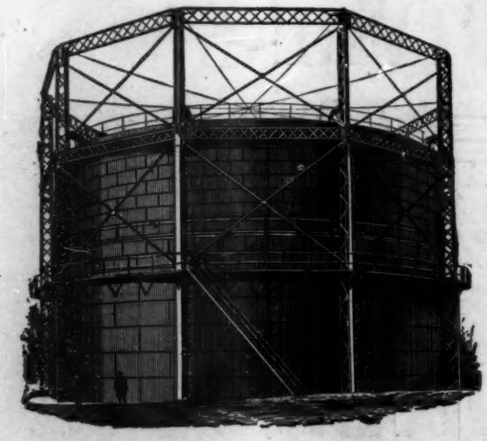

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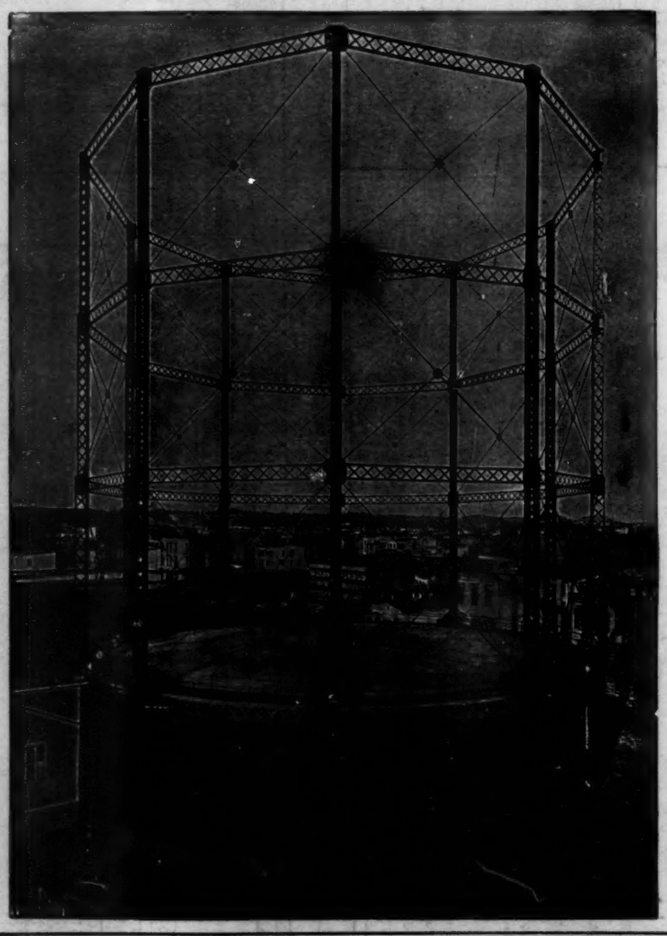

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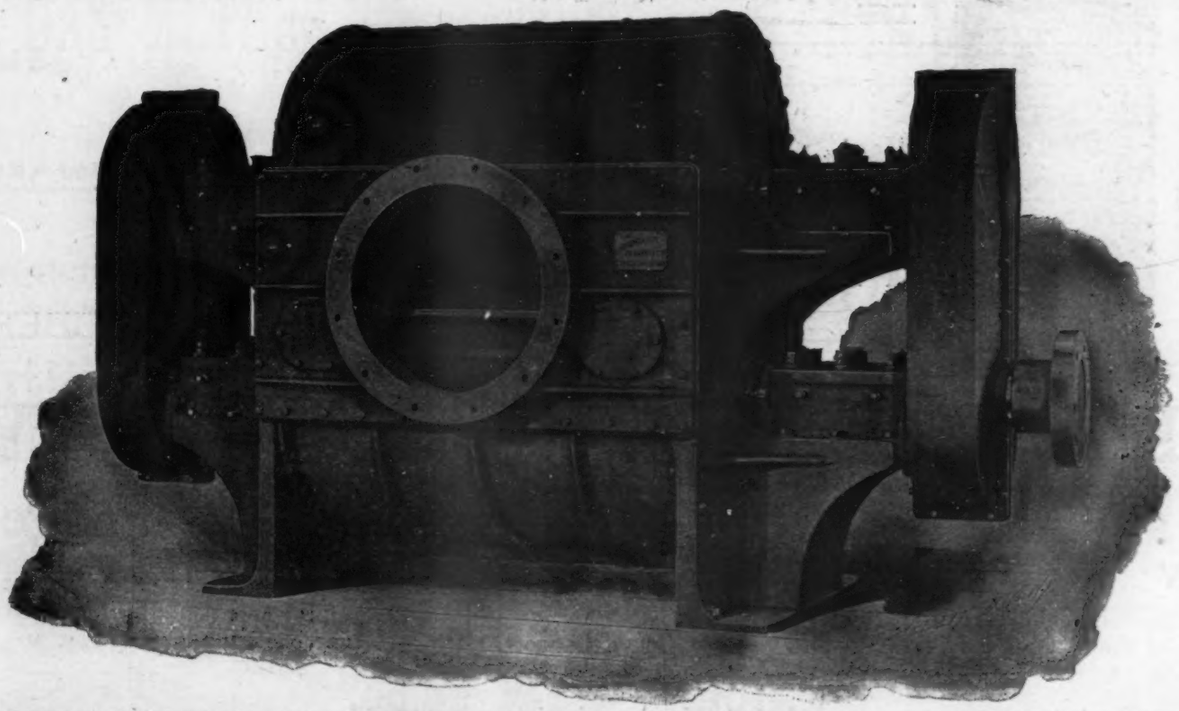

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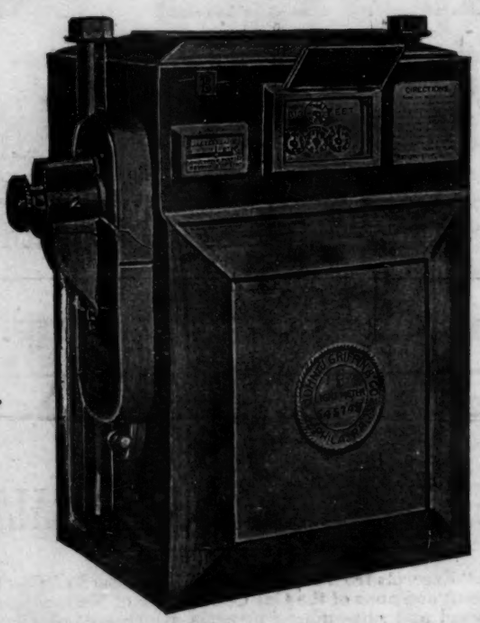

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